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THESIS

CASH MANAGEMENT IMPROVEMENT IN THE
NAVY STOCK FUND

by

James E. Linquist
and
Timothy S. Evans

March 1986

Thesis Advisor: Joseph G. San Miguel

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The authors examined the background and current operation of the NSF with emphasis on identifying areas which would enable better cash management within the NSF and thereby improve the overall cash position of the U. S. Treasury.

Six areas not presently included in specific Federal cash management programs were identified which offer potential NSF cash management improvements. Ten specific cash management recommendations are provided which would assist in minimizing the amount of NSF cash held outside the

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Cash Management Improvement in the Navy Stock Fund

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ABSTRACT

The Navy Stock Fund (NSF) is a working capital fund used to purchase and hold designated inventories of supply items at various stock points until needed by a customer. The fund is currently comprised of ten separate Budget Projects with total collections and expenditures projected to be in excess of $18 billion for Fiscal Year 1986.

The authors examined the background and current operation of the NSF with emphasis on identifying areas which would enable better cash management within the NSF and thereby improve the overall cash position of the U.S. Treasury.

Six areas not presently included in specific Federal cash management programs were identified which offer potential NSF cash management improvements. Ten specific cash management recommendations are provided which would assist in minimizing the amount of NSF cash held outside the Treasury Cash Account.

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I. INTRODUCTION

A. GENERAL INFORMATION

Effective cash management is a subject which has received ever increasing attention in both the private and public sectors during the past twenty years. What exactly is it? An Office of Management and Budget report in October 1980 defined cash management as "getting the most out of the time value of money we collect, hold and disburse" [Ref. 1: p. 27]. Another definition states that cash management is the acceleration of receipts (expeditious billing, collecting, and depositing of receipts), timely disbursements (payments not early or late), and the investment of any excess cash balances [Ref. 2: p. 29].

In the sixties, the private sector recognized the significance of the time value of money and took appropriate steps to optimize it through improved cash management techniques. During the last ten years, the Federal government has made a concerted effort to incorporate these now standard private sector cash management procedures into the handling of its $1 trillion annual cash flow [Ref. 3: p. 34]. Cash management initiatives instituted through Department of the Treasury, General Accounting Office (GAO) and Office of Management and Budget (OMB) directives have had a major impact on public sector cash management policy and procedures within all federal agencies. Still, there are numerous opportunities left for improvement, and it is up to today's

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financial managers to accept the challenge of discovering and implementing them.

B. SCOPE AND OBJECTIVE

Recent efforts toward optimizing the levels of Federal Government cash balances have yielded various regulations and policies directed at minimizing the cash which is held outside the Treasury Department cash account, thereby minimizing the need for additional Federal debt. This thesis will deal with one area of the Department of the Navy's financial operations which impacts the Treasury account - the Navy Stock Fund (NSF). Primary emphasis will be on the cash management posture of the fund. This financial entity was selected for review based upon the magnitude of its financial transactions. In Fiscal Year 1984 (FY84) the through-put of the NSF (total collections plus expenditures) was in excess of $13 billion and in FY85 it was greater than $15 billion. Projections for FY86 and FY87 exceed $18 billion and $21 billion respectively. The NSF is the largest of all the Department of Defense Stock Funds. FY86 estimates of the NSF Corpus (total inventory and cash balance) exceed $19 billion. [Ref. 4: pp. 8,11]

The objective of this thesis is to identify areas of potential cash management improvement for the Navy Stock Fund. Current NSF cash management practices with regard to billings, collections, deposits, disbursements, and forecasting will be reviewed and the NSF itself will be examined in an effort to discover areas for potential cash management improvements.

C. METHODOLOGY

Research for this thesis was accomplished in five phases:
1) literature search; 2) interviews at NSF higher commands;
3) compilation of data and research; 4) interviews at West Coast NSF
activities; and 5) consolidation of findings.

During phase one available literature from the following data bases
was reviewed:

1. Defense Logistics Studies Information Exchange (DLSIE), U. S.
   Army Logistics Management Center, Fort Lee, Virginia.

2. Defense Technical Information Center (DTIC) and Defense
   Documentation Center, Defense Logistics Agency, Cameron
   Station, Alexandria, Virginia.

3. The Naval Postgraduate School thesis, technical reports, and
   general library collections, Monterey, California.

In addition to the above, reviews of pertinent Federal government cash
management programs and policies and of current NSF directives and
regulations were also conducted.

Phase two interviews dealing with cash management and general NSF
operations were conducted with Stock Fund managers and analysts in
Washington, D. C.; Mechanicsburg, Pennsylvania; and Philadelphia,
Pennsylvania. Interviews were conducted at the following NSF higher
commands:

Office of the Comptroller of the Navy, Washington, D. C.
Naval Supply Systems Command, Washington, D. C.
Navy Accounting and Finance Center, Washington, D. C.
Ships Parts Control Center, Mechanicsburg, Pennsylvania

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Fleet Material Support Office, Mechanicsburg, Pennsylvania
Aviation Supply Office, Philadelphia, Pennsylvania

Phase three consisted of a detailed review of the information collected during the literature search and the higher command interviews. This review highlighted areas requiring further data collection and helped to focus attention on pertinent issues to be clarified during the next set of interviews.

Interviews during phase four were conducted with NSF managers and analysts at West Coast NSF stock points to evaluate cash management practices at that level and to become familiar with the working relationships of these activities with their respective higher NSF commands. Interviews were conducted at these locations:

Naval Supply Center, San Diego, California
Naval Supply Center Puget Sound, Bremerton, Washington
Puget Sound Naval Shipyard, Bremerton, Washington

Phase five consisted of a consolidation of all findings and a listing of the potential cash management improvements within the NSF discovered during all previous phases of research.

D. THESIS ORGANIZATION

The first chapter of this thesis is an introduction to the topic of Cash Management Improvement in the Navy Stock Fund. It describes the scope and objective of the thesis and details the research methodology used to complete the thesis.

Chapter two provides background information which details cash management development within the public sector. The chapter discusses

cash management regulations development at the Federal, Department of Defense (DOD), and Department of the Navy (DON) levels.

Chapter three provides additional background information and describes how the Navy Stock Fund actually operates. The areas addressed include: 1) History of the Navy Stock Fund; 2) NSF basic operations; 3) NSF procurement financing; 4) NSF supply system operations; 5) NSF relations with other stock funds; 6) NSF organizational structure; 7) NSF stock point inventory structure; 8) NSF accounting procedures; and 9) Recent NSF developments.

Chapter four details the current cash management practices in place within the NSF. The fundamental cash management areas of billings, collections, disbursements and deposits are examined in an attempt to identify potential cash management improvements. NSF forecasting, pricing and budgeting procedures are additionally reviewed and the models used by NAVSUP and NAVCOMPT to forecast NSF end-of-period cash position for budget submission are compared.

Chapter five outlines areas for potential NSF cash management improvements which were noted during the research phases. Six areas are discussed: 1) Flexible Standard Pricing; 2) Forecasting; 3) Accounting; 4) Automated Data Processing; 5) Incentives; and 6) Human Factors.

Chapter six includes a summary of the study findings and the authors' conclusions and recommendations.

II.   CASH MANAGEMENT IN THE PUBLIC SECTOR

A. BACKGROUND

Cash management should be viewed as a fundamental activity of an organization's financial management function. Financial management deals with the efficient utilization of organizational resources to support objectives, and cash is one of the most important of these resources [Ref. 5: p. 58]. It is also the most difficult resource to control. Without cash an organization cannot operate.

The Department of Treasury serves as the treasurer for the United States government and is responsible for government-wide cash management policy and procedures. Serving in this capacity, the Treasury recognizes that the payoff that results from deriving the maximum benefit of cash resources (effective cash management) is an increased availability of funds, which directly impacts the amount of Federal borrowing to finance deficits or liquidity shortages [Ref. 6: p. 3]. It is the Treasury Department that bears the service cost of the Federal debt [Ref. 6: p. 27].

Treasury's interest in the topic of cash management has not always been shared by all agencies of the Federal government. Until fairly recently, development of cash management practices and techniques has been primarily a private sector phenomenon. The major consideration motivating private sector entities toward more effective cash management has been the opportunity for increased profits, a factor which is lacking within the public sector [Ref. 6: p. 2]. Federal agencies

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have not always recognized the importance of the time value of the money they collect, hold, and disburse. During the decade of the 1970's, an interest in the subject of cash management at department and agency levels evolved within the Federal government. Rising interest rates, increasing budget deficits, and a fluctuating economic environment had significantly increased the opportunity cost of money and dictated that improved cash management practices be developed for managing the Federal government's $1 trillion annual cash flow [Ref. 6: p. 29].

B. CASH MANAGEMENT AT THE FEDERAL GOVERNMENT LEVEL

Prior to the 1970's, a Federal government cash management policy and regulatory framework did not exist. The government did not have what could be described as a comprehensive cash management program [Ref. 3: p. 35]. In 1971, the Department of the Treasury established the Division of Banking and Cash Management. The mission of this division included the issuance of policy guidelines and procedural instructions for Federal agencies in managing cash. This was a renewed Treasury effort to share its interest in cash management with all the other Federal agencies. It was the first of many Federal cash management initiatives which have been undertaken during the last fifteen years, up to and including President Reagan's current "Reform 88" program [Ref. 5: p. 1]. A detailed chronological history of these various initiatives has been described in a previous Naval Postgraduate School thesis, "Cash Management Improvement in the Navy Travel Advance System", by Weesner, December 1984. It is not the intention to duplicate that effort

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here. However, it should be noted that the groundwork for a continuing cash management effort was established during that timeframe.

The cash management policy in use today throughout the Federal government is stated in Treasury Department Circular No. 1084. It requires that agencies conduct their financial activities such that cash available to the Treasury is maximized and unnecessary borrowing by the Treasury is precluded. Chapter 8000 of Part 6, Volume 1 of the Treasury Financial Manual (I TRFM 6-8000) contains the implementing instructions for this circular. The Federal Claims Collections Standards codify the policies which govern credit management, and these are described in Office of Management and Budget (OMB) Bulletin 83-11, titled "Debt Collection". This bulletin requires agencies to maintain cash management and debt collection action plans for implementing new initiatives. These action plans are monitored by OMB and the Department of the Treasury [Ref. 2: p. 29].

Three prominent pieces of legislation have significantly strengthened the control of Federal funds within the last four years:

The Prompt Payment Act of 1982 requires Federal agencies to pay their bills on time, to pay interest penalties when payments are late, and to take discounts only when payments are made within the discount period. The implementing instructions for the Act are contained in OMB Circular No. A-125.

The Debt Collection Act of 1982 authorizes Federal agencies to refer information on delinquent payments to consumer reporting agencies; use salary offset, where applicable, for recovering delinquent debts; assess interest, penalties and administrative costs on delinquent debts; and use private contractors to service and collect government debts. [Ref. 2: p. 29]

The Deficit Reduction Act of 1984 authorizes the Department of the Treasury to prescribe the mechanism to be used by Federal agencies to collect receipts and the time frames for deposit of the funds [Ref. 2: p. 30].

Several sophisticated funds transfer systems have been developed by the Department of the Treasury to accelerate Federal collections and disbursements, and are now available to government agencies for their use. The Treasury Financial Communications System (TFCS) provides for the transfer of funds between the Department of Treasury and the banking community through an electronic medium. This system eliminates the need for checks and the accompanying collection time since the funds are electronically transferred. This allows the funds to be available for use on the actual payment date. [Ref. 2: p. 30]

The Automated Clearing House System allows an individual or organization to authorize the government to automatically deposit or withdraw funds from a personal or corporate bank account. The funds are transferred through commercial depositories, Federal Reserve Banks, and the Department of the Treasury. [Ref. 2: p. 30]

The Lockbox System is an arrangement in which payments are mailed directly to a creditor's or agency's post office box that is serviced by a designated bank. The bank processes the checks on the day of receipt and wire transfers the amount into the agency's account. [Ref. 2: p. 30]

The Cash Concentration System links a network of commercial depositories when an agency makes deposits to a central concentrator bank through the automated clearing house system. This system services

the Treasury General Account. The funds are transferred into the Department of the Treasury through an electronic transfer under this system. [Ref. 2: p. 30]

These Federal cash management regulations and funds transfer system modernizations have led to a significantly improved cash management posture at the Federal level. Positive results have been attained through 1985. Following implementation of the Prompt Payment Act of 1982 through the OMB "Prompt Payment" Circular A-125, 99% of the government's recent payments are made in a more timely manner so that interest earned is maximized and late charges are minimized. Two years ago, 30% of the government's payments were made late and 45% were made early [Ref. 3: pp. 34-35]. Several other notable achievements are outlined in the OMB Report on Management of the United States Government for FY86:

> The financing of over $100 billion in government contracts has been tightened up under a policy change initiated by the Prompt Payment Act. OMB, through Circular A-125, advised Federal departments and agencies that progress payments can no longer be provided for commercial-type items, nor for items where progress payments are not customary commercial practice. Unless the exact timing of progress payments is specified in a contract, progress payments will be made 30 days after billing. Agencies must require something in return whenever progress payments are either added after contract award, made more frequently than monthly, or made at higher than normal rates.

> New techniques developed through a joint State/Federal task force require delivery of $80 billion in Federal grant funds only as they are needed. Historically, grantees withdrew grant funds early, and then deposited the funds in their own interest-earning accounts until needed.

> The Internal Revenue Service also has cut in half the processing time for millions of tax payments received at IRS Service Centers

nationwide. As a result, Treasury will have more than $100 billion available at least two days sooner, thus reducing the need for borrowed funds. [Ref. 3: pp. 35-36]

Federal cash management improvement has been steady during the last fifteen years. There now exists a policy and regulatory framework to guide agency activities. A summary of Federal Cash Management Documents is provided in Table 1 [Ref. 7: p. 28]. Cash management initiatives must now begin to originate from within the Federal agencies themselves. OMB and Treasury must rely on agency management and the internal audit function to ensure compliance with government-wide policies and regulations.

C. CASH MANAGEMENT AT THE DEPARTMENT OF DEFENSE (DOD) LEVEL

The cash management regulatory guidance promulgated by the Federal government applied directly to all public sector agencies, including the Department of Defense (DOD). The Treasury Cash Management Regulations (I TRFM 6-8000), OMB Circular NO.1084, Prompt Payment Act, Debt Collection Act, and the Deficit Reduction Act have all significantly influenced DOD's cash management practices. President Reagan's "Reform 88" program of comprehensive government reform provided additional impetus to DOD to establish and enforce a more effective program for managing cash. Management goals of zero interest penalties and early payments have been established [Ref. 8: p. 2]. Figures 2-1 and 2-2 depict DOD interest penalty payments and early payments from FY83 through the second quarter of FY85. Early payments have effectively been eliminated. However, interest penalties still present a problem within DOD.

TABLE 1

FEDERAL CASH MANAGEMENT DOCUMENTS

Legislative Acts:
- Budget And Accounting Act of 1921
- Budget And Accounting Procedures Act of 1950
- Debt Collection Act of 1982
- Prompt Payment Act of 1982
- Federal Managers' Financial Integrity Act of 1982
- Federal Claims Collection Act
- Deficit Reduction Act of 1984

Treasury Department Financial Manual, Volume I:
- Part 2, "Central Accounting and Reporting"
- Part 4, "Disbursing Regulations"
- Part 5, "Deposit Regulations"
- Part 6, Chapter 8000, "Cash Management"

Treasury Department Circulars:
- 176, "Depositories and Fiscal Agents"
- 830, "Disbursing Officers"
- 945, "Central Acconting for Revenues and Outlays and Related Assets and Liabilities"
- 965, "Reporting Year-End Status and Closing of Appropriation and Fund Accounts"
- 1075, "Cash Advances"
- 1076, "Payments to Financial Organizations"
- 1083, "Use of TFCS"
- 1084, "Cash Management"

Treasury Department Bulletins:
- 82-10, "Agency Deposit Transactions"
- 82-22, "Deposits-In-Transit"
- 83-14, "TFCS Payments"

Office of Management and Budget Circulars:
- A-011, "Annual Budget Estimates; Preparation of"
- A-034, "Budget Execution"
- A-112, "Monitoring Federal Outlays"
- A-123, "Internal Control Systems"
- A-125, "Prompt Payment"
- A-129, "Managing Federal Credit Programs"

Office of Management and Budget Bulletins"
- 83-06, "Cash Management"
- 83-11, "Debt Collection"
- 83-21, "Credit Reporting"

General Acccounting Office Policy and Procedures Manual

President's Private Sector Survey on Cost Control (Grace Commission)

DEPARTMENT OF DEFENSE
Interest Penalty Payments
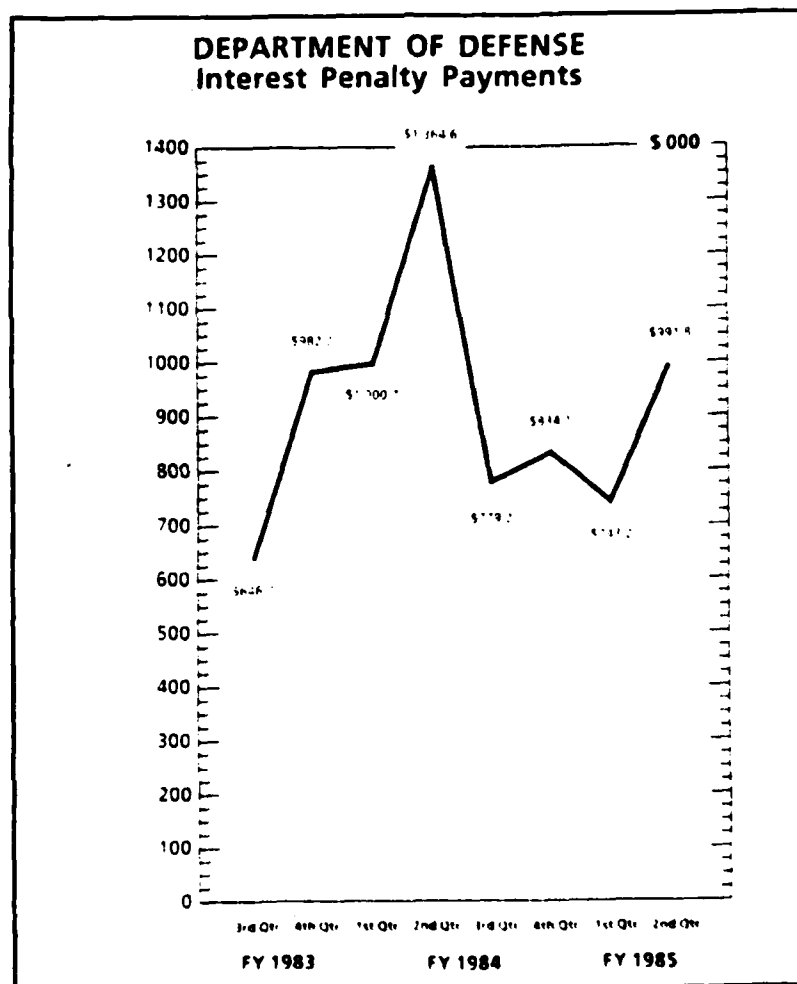
Figure 2-1 Department of Defense Interest Penalty Payments

Source: DOD Cash Management Trends 2nd Quarter FY85, Tab A

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DEPARTMENT OF DEFENSE
Early Payments

$ MILLION
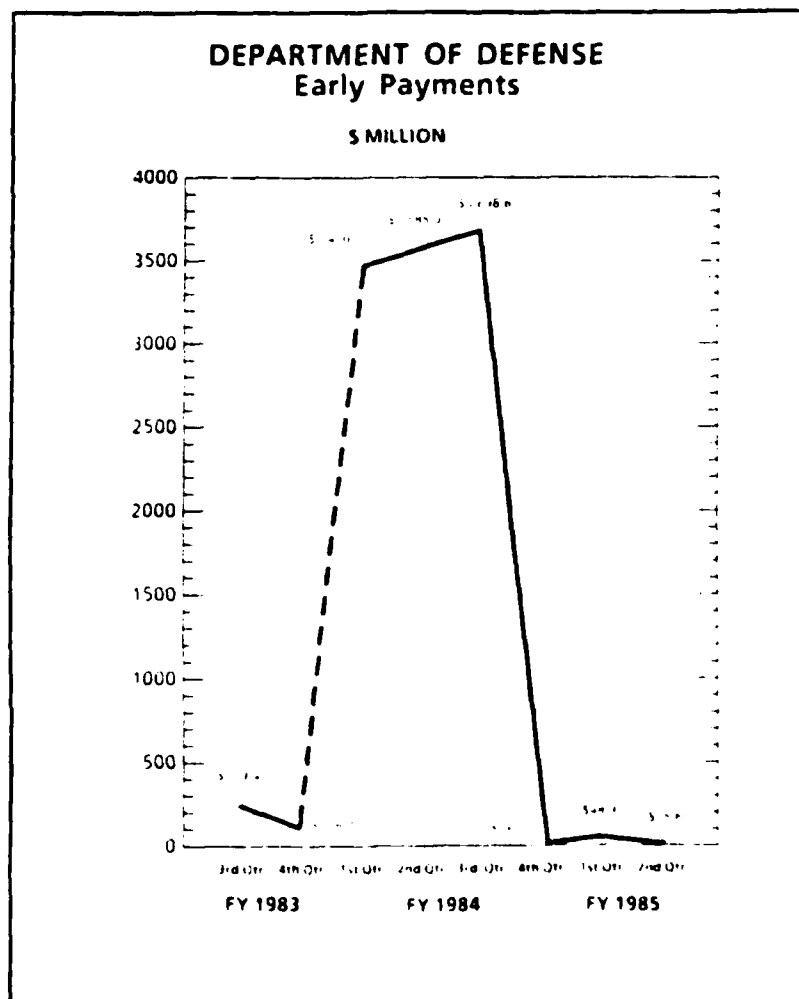
* Broken line represents a change in the reporting base with the addition of DLA

Figure 2-2 Department of Defense Early Payments

Source: DOD Cash Management Trends 2nd Quarter FY85, Tab A

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The Fiscal Year 1986 cash management savings goal established by DOD is $160.5 million. If attained, this will represent a total DOD savings to the Treasury of almost $380 million since the cash management program was formally established in FY83 [Ref. 9: p.1].

D. CASH MANAGEMENT AT THE DEPARTMENT OF THE NAVY (DON) LEVEL

General fiscal policy guidance for the Department of the Navy is contained in the Navy Comptroller's (NAVCOMPT) Manual. Cash management specific initiatives are consolidated in the DON Cash Management Action Plan (CASHMAP), which was required by OMB Bulletin 83-11. The DON CASHMAP is:

> . . . a consolidated approach in applying modern cash management techniques. These techniques are designed to improve the availability of cash resources to the Treasury, further the efficiency of its cash management operations, and decrease requirements for Federal borrowing. [Ref. 10: p. 2]

Figures 2-3 and 2-4 depict the Navy's interest penalty payments and early payments from FY83 through the second quarter of FY85. Figures 2-5 and 2-6 show these payments relative to other DOD agencies for the same period of time. DON has experienced a much more serious problem in the area of interest penalty payments due to continued delays in invoice processing. Numerous actions have been taken to correct the situation including: 1) application of Fleet Fast Pay procedures; 2) Navy-wide advisories; and 3) increased management attention [Ref. 8: p. 3]. The expected FY86 cash management savings projected for

NAVY
Interest Penalty Payments
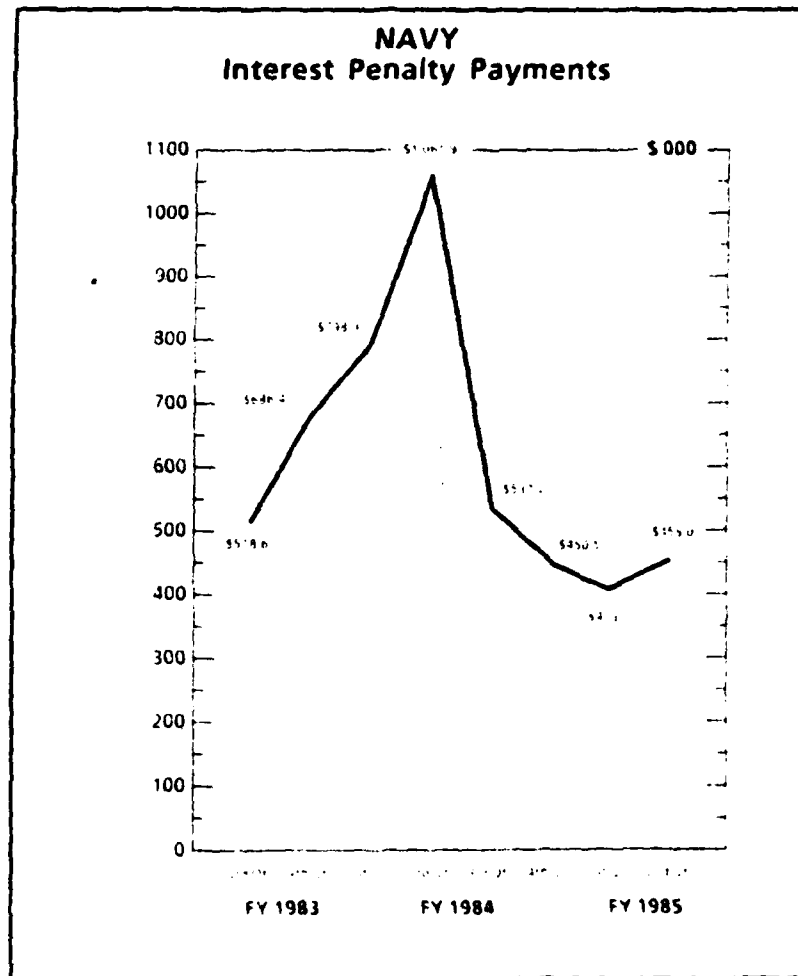
Figure 2-3 Navy Interest Penalty Payments

Source: DOD Cash Management Trends 2nd Quarter FY85, Tab A

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NAVY
Early Payments

$ MILLION

250
225
200
175
150
125
100
75
50
25
0

FY 1983   FY 1984   FY 1985
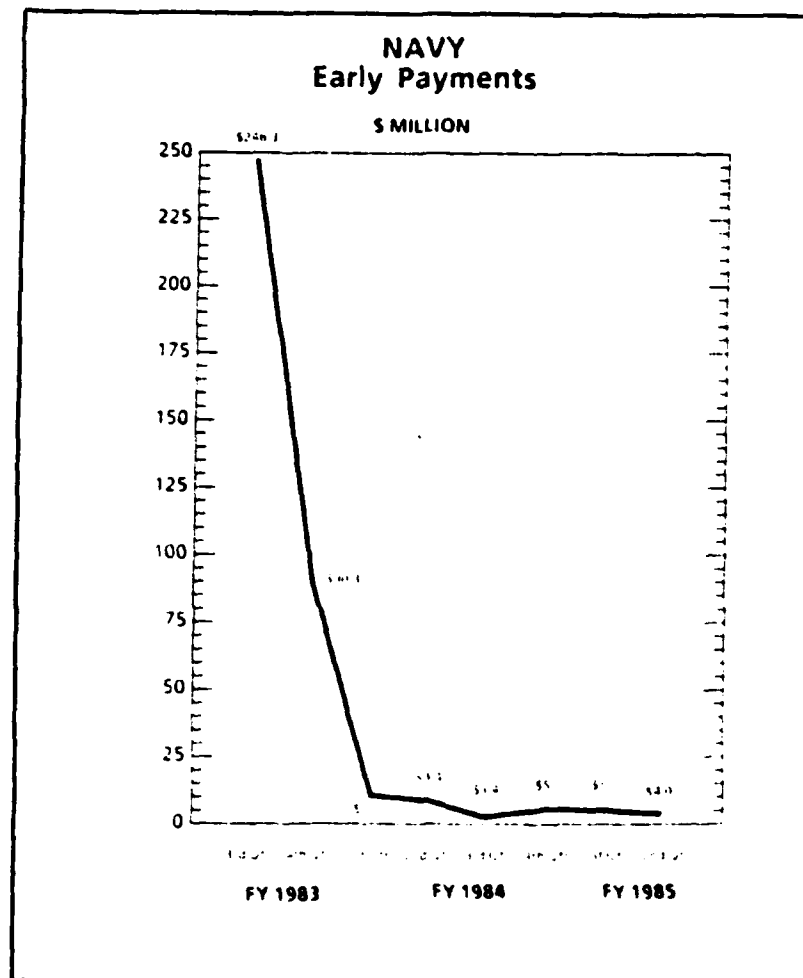
Figure 2-4 Navy Early Payments

Source: DOD Cash Management Trends 2nd Quarter FY85, Tab A

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DOD COMPONENTS
Interest Penalty Payments

Figure 2-5 DOD Components Interest Penalty Payments

Source: DOD Cash Management Trends 2nd Quarter FY85, Tab A

DOD COMPONENTS (EXCLUDING DLA)
Early Payments
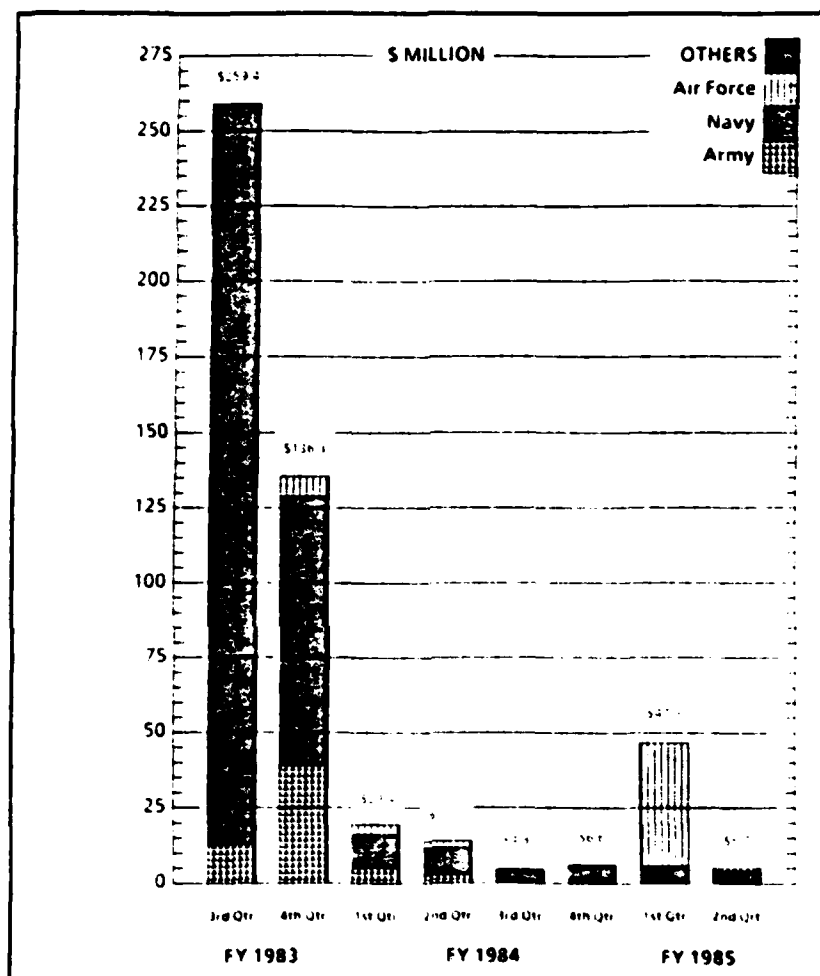
Figure 2-6 DOD Components Early Payments (excluding DLA)

Source: DOD Cash Management Trends 2nd Quarter FY85, Tab A

the DON is $9.45 million, which represents 6% of the total savings projected for DOD [Ref. 9: p. 1].

The success of cash management in the Department of the Navy and in the Federal government as a whole depends largely on the extent to which financial managers and operating personnel in each agency accept the challenge to improve cash management practices within their individual agencies. This thesis will examine that area with regard to the Navy Stock Fund and will focus upon identifying potential areas of cash management improvement within this fund.

III. NAVY STOCK FUND BACKGROUND AND OPERATIONAL CONCEPTS

A. HISTORY OF THE NAVY STOCK FUND

The Navy Stock Fund (NSF) is the oldest of all the Department of Defense (DOD) stock funds. The management concept utilized to operate the NSF is one which actually dates back to 1878 when the "General Account of Advances" was established to provide financing for Navy inventories. This was an annually appropriated fund and its size varied from year to year. Prior to this time all supply inventories were maintained and issued on the basis of free issue. [Ref. 12: p. 13]

In 1893, Congress passed the "Navy Supply Fund Act" which instituted the basic concept behind today's NSF operation—the working capital fund. This act created a "Corpus" or body of capital of $200,000 for procurement of "ordinary commercial supplies." Standard procedure called for the Corpus to be reimbursed by customer appropriations when material was issued to them. Thus, the "revolving nature" of the NSF was established. [Ref. 13: p. 3]

Legislative action in 1942 officially established the name "Navy Stock Fund" and increased the size of the Corpus significantly to accommodate the increased wartime needs and requirements of the Navy [Ref. 14: p. G-3]. In 1947, Congress began to consider the wider use of the working capital fund concept within the Department of Defense (DOD). Both the Senate and House reports on this subject addressed the NSF, emphasizing its long existence and the benefits achieved by proper

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handling of inventories of common-use items [Ref. 15: pp. 24-25]. When the National Security Act of 1947 was amended in 1949, Title 10 U. S. C. 2208 of that act authorized the Secretary of Defense:

. . . to require the establishment of working capital funds in the Department of Defense for the purpose of (1) financing inventories of such stores, supplies, materials and equipment as he may designate; and (2) providing working capital for such industrial-type activities, and for such commercial-type activities as provide common services within or among the departments and agencies of the Department of Defense, as he may designate [Ref 15: pp 25-26].

Working capital funds were now authorized for other services and agencies within DOD for the purpose of financing supply inventories with long term goals of recovering all costs and working to a zero profit [Ref. 14: p. G-4].

In 1955, the Secretary of Defense established a formal charter for the Navy Stock Fund. This charged the Chief, Bureau of Supplies and Accounts (later named Commander, Naval Supply Systems Command) with the responsibility for administration and management of the NSF [Ref. 13: p. 4]. In January 1967, the Department of Defense promulgated DOD Directive 7420.1, "Regulations Governing Stock Fund Operations," which contains policy guidance and procedures for administration of the NSF. This directive remains in effect today and is used by stock fund administrators to conduct NSF operations. Finally in 1971, the Navy Stock Fund charter was revised to establish the Chief of Naval Operations (CNO) responsibility for oversight of NSF operations [Ref. 13: p. 4].

The NSF has enjoyed a long and successful operation during the last ninety years. Since 1893, the NSF Corpus has grown from $200,000 to an

estimated $19 billion for FY86. The favorable comments and feelings expressed by many logistics experts and congressional reviewers over the years have highlighted the effectiveness and efficiency of the NSF as a tool for inventory management. The management concept used in its operation is credited with a great degree of its success. [Ref. 15: p. 45] This working capital/revolving fund concept is described in detail in the next section.

B. BASIC OPERATION

The Navy Stock Fund is a working capital or revolving fund established within DOD by Title 10 U. S. C. 2208 and previous legislation. The purpose of the NSF is to finance inventories of stores, supplies, materials, and equipment to support ships, aircraft, personnel, and the shore establishment of the United States Navy [Ref. 16: p. a-5]. It should be noted here that a "fund" is defined by the Navy Comptroller's Manual as "a separate unit of accountability for financial resources" [Ref. 16: p. a-4]. More specifically, in government accounting, the word "fund" has a special technical meaning:

A fund is defined as an independent fiscal and accounting entity with a self-balancing set of accounts recording cash and/or other resources together with all related liabilities, obligations, reserves, and equities which are segregated for the purpose of carrying on specific activities or attaining certain objectives in accordance with special regulations, restrictions, or limitations. [Ref. 7: p. 16]

Funds are created to allow management personnel to focus on a particular isolated area as a single entity to allow a more efficient operation in

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that area. It is not government practice, however, for fund managers to be concerned with making a profit [Ref. 15: p. 49].

Working capital or revolving funds are used as continuous financing mechanisms for services which are paid for by customers upon completion of that service. Costs incurred while performing the service are paid from the working capital fund of the activity actually doing the job. Upon completion of the job, the customer is billed, and the fund is reimbursed. As previously mentioned, working capital funds have two goals: 1) recover all costs; and 2) work toward a zero profit [Ref. 14: p. G-4].

The NSF is an example of a working capital fund which purchases and holds designated inventories of supply items at various stock points until they are needed by a customer. This resembles a retail store such as Sears or J. C. Penney's in the private sector. When the item is issued to the customer activity, the financing appropriation of that activity is charged so that the NSF can be reimbursed for the items which were provided. Figure 3-1 illustrates the basic NSF operation [Ref. 13: p. 5]. This operation is further described in the Navy Stock Fund Management Handbook:

> The two principal assets of a Stock Fund are cash and material. Cash flows out of the fund when vendors are paid for deliveries of material. Cash flows into the fund as collections are made for issues of material to the fund's customers. Stock funds recycle cash into inventory and inventory into cash on a continuing basis just like a local business. [Ref. 13: pp. 5-6]

Table 2 shows the NSF ending cash and inventory account balances for FY79 through FY84 [Ref. 17].
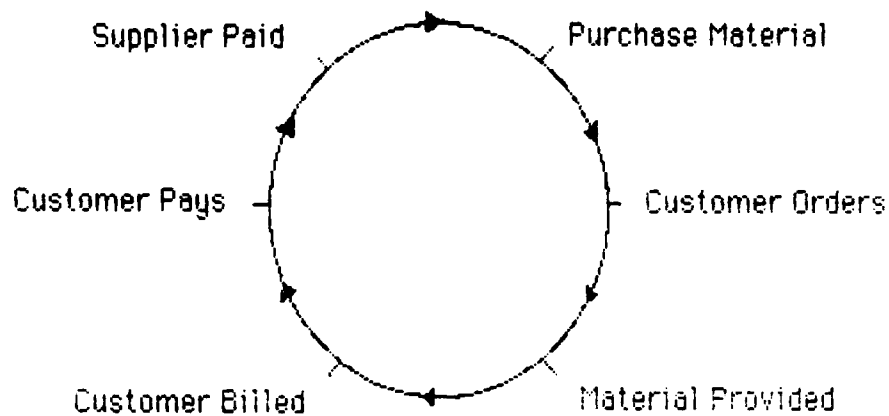
Figure 3-1 Basic NSF Operation

TABLE 2

NAVY STOCK FUND CORPUS

($ millions)

Fiscal Year	Cash	Inventory	Total
1979	217	2263	2480
1980	214	2829	3043
1981	263	5867	6130
1982	384	7725	8109
1983	662	9809	10471
1984	1334	12351	13685

The Management Handbook further states:

As with any commercial retail operation, the stock fund pays
for transporting material to the "store", experiences losses of
material, and procures material in anticipation of customer
demand which doesn't occur. These on-going costs of operating a
"store" result in cash outflow that must be recouped. This is
accomplished by adding a surcharge to the procurement charge of
an item to determine a selling price, or standard price, which is
charged to customers. [Ref. 13: p. 6]

Navy Stock Fund surcharges and pricing procedures will be discussed in
more detail in Chapter IV.

C. PROCUREMENT FINANCING

The NSF's obligational authority, the authority to commit the United
States government to pay bills, is acquired through the apportionment
process rather than the appropriation process. Obligational authority is
apportioned from the Office of Management and Budget (OMB) and
allocated to the NSF via the Office of the Secretary of Defense,
NAVCOMPT, and CNO for use whenever it enters into commercial vendor
contracts or places orders with other stock funds. This obligational
authority is budgeted for and requested by the NSF in three separate
programs: operations, inventory augmentation, and mobilization stocks
(prepositioned war reserves). The daily business of replacing
inventory which has been issued to customers constitutes the operational
obligation requirement. Additional cash appropriated by Congress is
usually not associated with this program since the NSF cash is
reimbursed from customer appropriations. The inventory augmentation

and mobilization programs, however, constitute actual decisions to invest in inventory growth and represent an increase in the Corpus. Cash for these two programs must be appropriated by Congress before obligations can be incurred to procure this additional material. [Ref. 13: pp. 7-8]

The NSF differs significantly from a working capital fund such as the Navy Industrial Fund (NIF), which derives its total spending authority from its customers' appropriated funds. The NIF normally will not obligate funds unless they have orders in hand from customers who have obligational authority. [Ref 13: p. 8]

NSF obligations, conversely, can be made in anticipation of customer orders, which allows for a more flexible operation. The NSF's authority to conduct business in this manner comes from a congressionally approved device known as contract authority, which permits the NSF to temporarily finance the procurement lead time of material required by its customers at a future date. The customer appropriations are obligated only when a requisition-customer order is placed with the NSF. The material, ideally, is on hand at the stock point when the customer needs and orders it and the procurement charges to that end user are deferred until the material is actually used. [Ref. 13: p. 9]

D. SUPPLY SYSTEM OPERATIONS

Two categories of material are currently stocked in the Navy Supply System: principal and secondary items. An aircraft engine is an example of a principal item. These are generally end items of equipment which stand alone and perform a function. Principal items are not financed by the Navy Stock Fund. They are financed by procurement appropriations and

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are procured based upon program related data rather than recurring consumption. Principal items, held in the Appropriation Procurement Account (APA), are issued to the end user without charge to his operating funds. [Ref. 13: p. 15]

Secondary items are totally financed by the NSF and are held in the Navy Stock Account (NSA). These are items such as engine components or transistors which are employed in conjunction with a primary item as it performs its function. Secondary items are further sub-classified by their repair capability as depicted in Figure 3-2 [Ref.13: p.17].

```
                                                          DEPOT LEVEL REPAIR

                              ECONOMICALLY
                              REPAIRABLE

    SECONDARY ITEMS                                       FIELD LEVEL REPAIR


                              NOT ECONOMICALLY            CONSUMABLE
                              REPAIRABLE
```
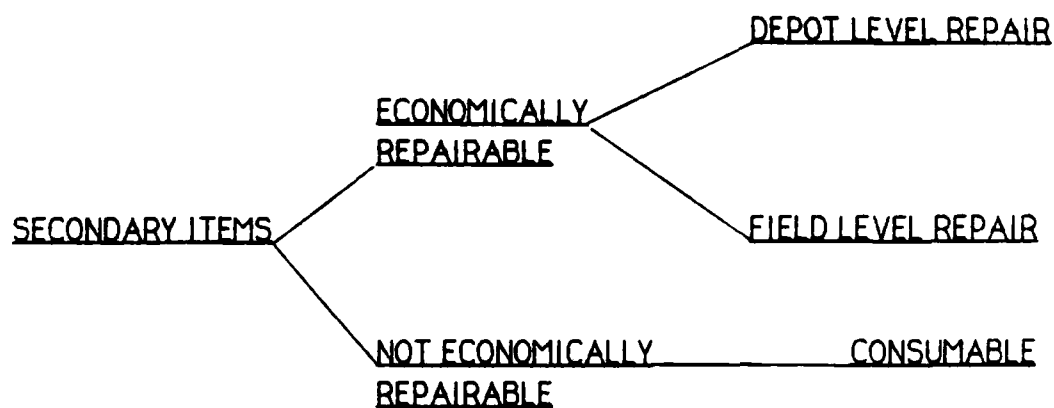
Figure 3-2 Secondary Item Sub-classifications

A consumable secondary item is one which cannot be repaired, such as a gasket or a paper clip. Secondary items which can be repaired are either Depot Level Repairables (DLRs) or Field Level Repairables (FLRs),

based upon which type of maintenance level activity is authorized to decide whether the item is economically repairable or not. The repair of DLRs is financed by the NSF, while the repair of FLRs is financed by the customer's operating funds. [Ref. 13: pp. 16-17] Note here, that prior to 1981, DLRs were not financed by the NSF. In April 1981 non-aviation DLRs were added to the NSF and in April 1985 a test program for financing aviation DLRs from NSF funds was commenced. This will be further discussed in section I of this chapter.

E. RELATIONSHIPS WITH OTHER STOCK FUNDS

Navy customers receive supply support from six different stock funds: Navy, Marine Corps, Army, Air Force, Defense Logistics Agency (DLA), and the General Services Administration (GSA). Each of these funds is maintained as a separate entity. Table 3 depicts the relative size of the DOD stock funds as of 30 September 1984 [Ref. 17]. Every item in the Federal Supply System is assigned to one of these DOD or GSA stock funds for exclusive management. Each item assigned to the Navy is in turn assigned to a Navy Inventory Control Point (ICP) for wholesale worldwide management. The NSF, in addition to managing its own items, buys material from ICP's within each of the other stock funds, as well as from commercial vendors, to provide the required support for its customers. [Ref.13: p.18]

The Defense Logistics Agency is a unique stock fund in that it was created to manage high demand items, common to all branches, which were previously managed by the individual service stock funds. The NSF, through the Fleet Material Support Office (FMSO), buys these items from

DLA and, in some cases, direct support is provided to Navy customers
from DLA owned material which is stored at the Navy stock point. The

TABLE 3

DOD STOCK FUND INVENTORY VALUES AS OF 30 SEPTEMBER 1984

($ in millions)

DOD Stock Fund	Inventory	%
Navy	12351	34.8
DLA	10533	29.7
Air Force	6758	19.1
Army	5487	15.4
Marine Corps	342	1.0
Total	35471	100.0
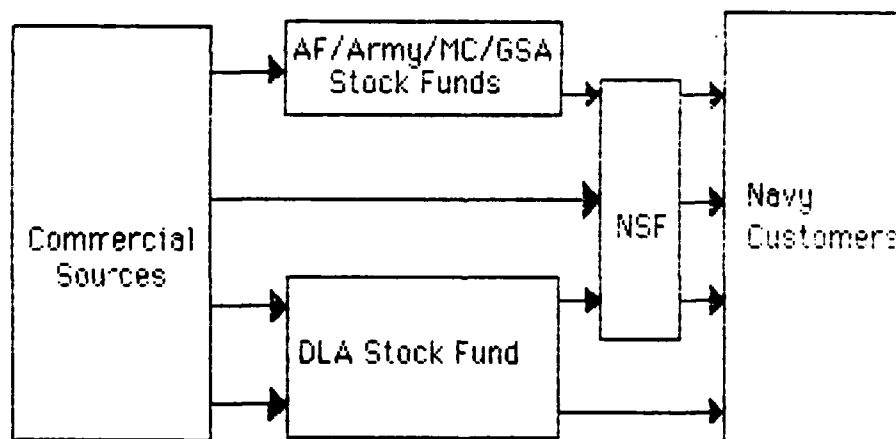
Figure 3-3 NSF Relationship With Other Stock Funds

NSF relationship with DLA and the other stock funds is illustrated by
Figure 3-3 [Ref. 13: pp. 18-19]. Note again that the NSF supports its

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many customers by procuring Navy managed items from commercial sources and non-Navy managed items from the five other stock funds.

F. ORGANIZATIONAL STRUCTURE

Under the direction of the Secretary of the Navy, and the Chief of Naval Operations (OPNAV Sponsor-OP 04), the Commander, Naval Supply Systems Command (COMNAVSUP), is responsible for administration and management of the Navy Stock Fund. The Assistant to the Commander for Stock Fund Management (CODE 013) is tasked by NAVSUP Instruction 5400.4E to:

> Establish, review, support, and maintain control of all aspects of the Navy Stock Fund; insure the development and operation of material and financial programs for all Navy secondary items; provide assistance to item managers in the development of stratification and inventory management programs; provide guidance concerning war reserve requirements and funding; and coordinate, monitor, analyze NSF financing of new programs. [Ref. 18: p. 01-3]

In carrying out these duties, CODE 013 simultaneously reports to the Deputy Commander Financial Management/Comptroller (CODE 01). The NAVSUP Headquarters organizational relationships and those within CODE 013 are further delineated in Figure 3-4. Three divisions make up the Code 013 office: 1) Financial Analysis and Cash Management; 2) Program Budgeting and Control; and 3) Replenishment Budget. [Ref. 18: p. 01-1]

As illustrated in Figure 3-5, the NSF is financially structured into ten Budget Projects (BPs) which receive quarterly suballocations of obligational and commitment authority from NAVSUP. Six of these

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projects are managed at the three Navy ICP's: Ships Parts Control Center
(SPCC), Aviation Supply Office (ASO), and the Navy Publications and Forms
Center (NPFC). Three are managed by the Navy Retail Offices: Fleet
Material Support Office (FMSO) and the Navy Resale and Services Support

```
┌─────────────────────────────────────┐
│ Commander                        00 │
│ Vice Commander                   09 │
├─────────────────────────────────────┤
│ Deputy Commander                    │
│ Financial Management/Comptroller 01 │
├─────────────────────────────────────┤
│ Assistant to Commander              │
│ for NSF Management              013 │
├─────────────────────────────────────┤
│ Financial Analysis and Cash         │
│ Management Division             0131 │
├─────────────────────────────────────┤
│ Program Budgeting and               │
│ Control Division                0132 │
├─────────────────────────────────────┤
│ Replenishment Budget Division   0133 │
└─────────────────────────────────────┘
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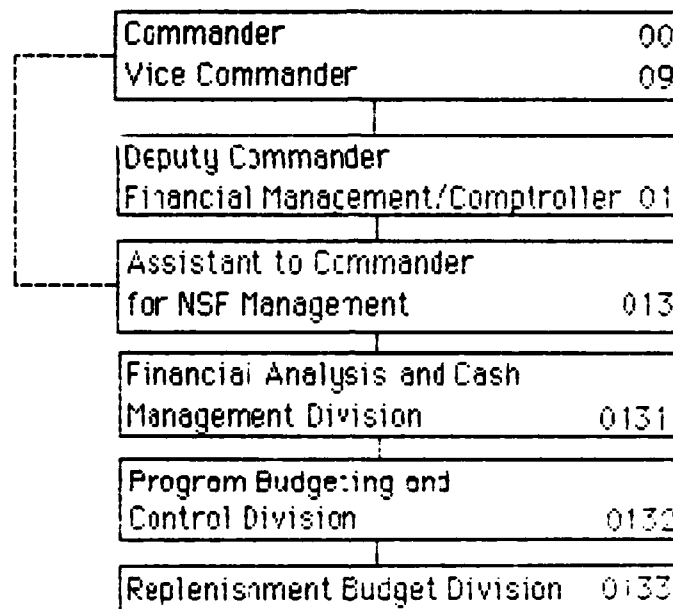
Figure 3-4 NSF Headquarters Organization (NAVSUP)

Office (NAVRESSO). The tenth Budget Project is managed by NAVSUP
Code 013. [Ref 17] Table 4 provides a description of each Budget
Project [Ref 19: pp.1-26-1, 1-27]. Table 5 illustrates the relative size
of each BP and the magnitude of the overall NSF operation [Ref. 4: p. 4].
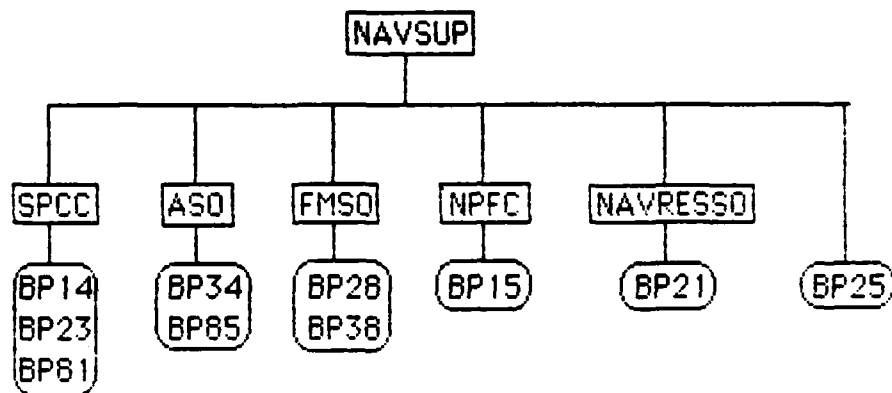
Figure 3-5 Navy Stock Fund Budget Project Managers

TABLE 4

NSF BUDGET PROJECTS (BP)

BP	Category of Materials
14	Shipboard Consumables
15	Forms and Printed Matter
21	Ships/Commissary Store Stock
23	Ships Overhaul Material
25	Special Navy Stock Account Clearance and Transactions
28	Retail Reapair Parts and Supplies
34	Aviation Consumables
38	Retail Fuel and Related Items
81	Shipboard Depot Level Repairables
85	Aviation Depot Level Repairables

Three BPs are used in NSF operations which are not part of the supply system. BP21 finances Commissary Stores and Ships Stores Afloat Resale items and BP23 is used to finance Ship's Overhaul Material for the Navy Industrial Fund. BP25 finances fuel reclamation and is used by NAVSUP as a clearance account for unusual transactions. [Ref. 13: p. 21] Budget Project managers are responsible for the project budgets, funds allocation and execution, and accounting. ICP project managers generally execute the resources suballocated to them by contracting for material (assigned to them for management) from commercial vendors. The ICP,

TABLE 5
NAVY STOCK FUND SUMMARY FY86
(NAVSUP request, $ in millions)

BP	Orders	Obligations	Expenditures	Peacetime Inventory EOP Value
14	464.7	530.5	484.9	2422.1
15	14.0	14.8	13.4	18.6
21	1017.6	1033.1	1030.5	126.3
23	192.4	195.0	222.1	28.8
25	1.0	1.0	1.0	-
28	1534.5	1763.8	1766.1	1106.0
34	718.6	832.1	954.6	3415.7
38	1849.4	1822.9	1839.0	259.0
81	1005.2	1461.8	1387.1	7022.6
85	1846.3	3347.5	1885.4	4224.1
TOT	8643.7	11002.5	9584.1	18623.2

however, does not hold this material on its premises. The delivery of the material is consigned to Navy stock points which actually receive and

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store it in their warehouses. Afloat outlets are also used and include the Mobile Logistics Support Force (MLSF) ships, tenders, and aircraft carriers which carry a tailored range of material to enable support for a specific group of customers or purpose. [Ref. 13: p. 23]

Fleet Material Support Office project management is similar to the ICP process because no NSF material is held on FMSO premises. However, the execution of FMSO's resources differs from the ICP's in that FMSO makes its Budget Projects (which finance retail repair parts, supplies and fuel) available to the ashore and afloat NSF outlets to spend through specific and open allotment for each BP. [Ref. 13: pp. 95-96] Specific and open allotments will be described in more detail in section H.

The total number of FMSO Stock Fund activities exceeded 430 in FY84. A breakdown is provided in Table 6 which depicts the wide range of units that constitute the lowest level of the NSF structure [Ref. 20].

G. STOCK POINT INVENTORY STRUCTURE.

NSF inventories are carried at many afloat and ashore outlets. Table 7 shows the distribution of NSF inventories as of 30 September 1984 [Ref. 17]. As mentioned in the previous section, the NSF afloat outlets consist of Mobile Logistics Support Force ships which carry tailored inventory lists for specific customers such as the Aviation Consolidated Allowance List (AVCAL) maintained for aviation units aboard aircraft carriers.

TABLE 6

FMSO STOCK FUND ACTIVITIES

Ashore		Afloat	
Naval Supply Centers	8	AFS/AO/TAO	39
Naval Supply Depots	3	AS/AD/AR	29
Naval Air Stations/		CV/CVN	14
Facilities	23	LHA/LPH	12
Marine Corps Air		MAG	13
Stations/Facilities	7		
Naval Hospitals	19		
Naval Training Centers	3		
Naval Shipyards	2		
Misc Activities	34		
Ready Supply Stores/			
Shop Stores	150		
SERVMARTS	80		
Total Outlets	328		107

TABLE 7

DISTRIBUTION OF NSF INVENTORIES AS OF 30 SEPTEMBER 1984
($ in millions)

	Ashore		Afloat	
	CONUS	Overseas	Supply Ships	Total
Aviation	2034.8	127.8	232.2	2394.8
Ship Parts	7857.1	50.6	408.0	8315.7
General Support	658.9	467.3	406.7	1532.9
Commissary and				
Ships Stores	54.2	20.3	33.1	107.6
Total	10605.0	666.0	1080.0	12351.0

Inventories carried in the NSF at the various stock points ashore are divided into wholesale and retail segments. The NAVCOMPT manual defines wholesale and retail inventories as follows:

a. Wholesale. Wholesale inventories are those managed by Navy inventory managers under the DOD single manager concept. These are items for which the Navy is the primary user. They are purchased from vendors under contracts and "pushed" or directed to various stock points based on projected customer requirements. This includes the requirements of other military services which may utilize the item. Financial inventory accounting for these inventories, when stocked at activities operating under the Centralized Accounting and Billing (CAB) concept, is performed by the cognizant inventory control point (ICP) which also maintains visibility of quantities and locations of inventories. This asset visibility and accountability is facilitated through transaction item reports (TIR) submitted by the stock points operating under the CAB concept for each receipt or issue of an item of inventory. Financial inventory accounting for wholesale stock at non-CAB activities is performed by the local stock point.

b. Retail. Items carried in retail inventories are those managed by other DOD components and General Services Administration, but stocked by the Navy for its own use. There is no Navy-wide visibility of these assets, and it is the responsibility of the local stock point including ships and aviation units designated as special accounting class 207 units (NSF financed load and allowance list carried on board) to ensure adequate stocks to satisfy local customer demands. Retail inventory also includes items managed by Navy inventory managers under the DOD single manager concept for which the Navy is the primary user, however, the inventory is held below the wholesale level as defined in subpar. a. [Ref. 19: p. 1-1]

Wholesale material is provided to or "pushed" to the stockpoints by Navy ICPs and in some cases by the Defense Logistics Agency for storage and issue. The wholesale material is held in the "main store" of the stock point and it is from these "main stores" that the supply system provides requisitioned material to Navy customers. [Ref. 14: pp. G-9,G-10] To support local Navy customers, the stock point can also maintain retail outlets separate from the main store. Retail material can be ordered from vendors or other stock funds or may be recategorized from wholesale stock in the "main store" to retail stock. The stock point effectively "pulls" the material when it orders from other sources. This retail material can be stocked in either the "Ready Supply Store" which serves a particular customer located near the stock point or in a "Servmart" which provides ready access to high demand consumable items for local customers. [Ref. 14: pp. G-9,G-10]

New NSF obligational authority is not committed when Navy wholesale material is recategorized as retail material by a stock point. This is an intra-Navy transfer which involves the transfer of accountability for the material from the ICP level to the stock point. Physical movement of the material may or may not occur. Similarly, when material is ordered from the wholesale stock of one Navy stock point to be placed in retail stock at another Navy stock point (actual physical movement of the material occurs), no new NSF obligational authority is used. This type of action is called an "Other Supply Officer" (OSO) transfer which also transfers accountability for the material. When DLA wholesale material held at a Navy stock point is recategorized as retail material new NSF obligational authority is used. This transfer

is not an intra-Navy action and the NSF is actually purchasing the
material from the DLA stock fund. [Ref. 14: p. G-10] Figure 3-6
summarizes the various types of inventory that may be held at a Navy
stock point [Ref. 14: p. G-11].

			Navy Managed Material	DLA Managed Material	Other Managed Material
S T O C K	P O I N T	Wholesale	Main Store	Push	Push	N/A
		Retail		Pull	Pull	Pull
			Ready Supply Store	"	"	"
			Servmart	"	"	"

Figure 3-6 NSF Stock Point Inventory Structure

H. ACCOUNTING

The NSF is an apportioned revolving fund which purchases material
from its cash account and carries it in the Navy Stock Account. Since it
is an apportioned and revolving fund, three types of accounting are
required to be performed for the NSF: 1) obligational accounting; 2)
financial inventory accounting; and 3) revolving fund accounting.
Obligational and financial accounting are decentralized to the BP/stock
point levels while revolving fund accounting is centrally provided by the
Navy Regional Finance Center (NRFC) in Washington D.C. [Ref. 13: p. 100]
A description of each accounting type will be provided in this section.

1. Obligational Accounting

Obligational accounting is performed within each BP by the
Authorization Accountng Activity (AAA) assigned to each activity
holding NSF obligational authority. The procedures used by the AAA in
accomplishing this task, and which agency acts as the AAA, is dependent
upon which obligational accounting method is used by the BP manager in
executing his allotted obligational authority. Specific Allotments,
Centrally Managed Allotments or direct execution of the obligational
authority are available for the BP managers use [Ref. 13: p. 94].

Specific allotments are provided by BP managers to various field
activities, such as a Naval Supply Center (NSC), by a NAVCOMPT Form 372
Allotment Authorization and the recipient receives R.S. 3679
responsibility (responsibility not to overspend a maximum dollar limit)
for the obligational authority. As described in section F of this chapter,
the Fleet Material Support Office provides this type of allotment to its
retail stock points to enable them to order supplies from commercial
vendors and other stock funds [Ref. 13: pp. 94-95]. When specific
allotment accounting is used, the AAA processes procurement
transactions against allotted NSF obligational authority for each activity.
These transactions are classified as commitments (requests for contract
procurement), obligations (firm contracted orders) and expenditures
(actual disbursements of allotted funds). Receipt of material is also
tracked to maintain accurate records of accounts payable (material
received but not paid for) and material-in-transit (paid for but not
received). Figure 3-7 depicts the various obligational accounting

categories of the NSF. A monthly summary of all the obligational
authority transactions for each specific allotment holder (NAVCOMPT
Form 2129 Status of Fund Authorization - Stock Fund) is compiled by the
AAA and then sent to each controlling BP manager. [Ref. 13: pp. 95-96]

Request a   Let a   Pay Contractor's
Contract   Contract   Bill

Commitment	Obligation	Expenditure

<------------ Cash Account ------------>|Inventory Account+|

| Account Payable |

Material Receipt---

| Material-in-Transit |
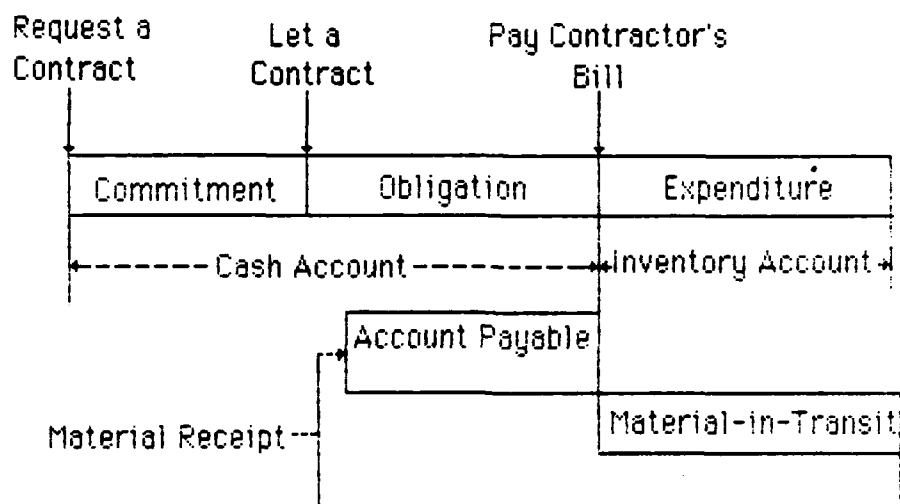
Figure 3-7 NSF Obligational Accounting Categories

A centrally managed or open allotment may be used by a BP manager
to finance NSF obligations incurred by units which do not hold a specific
NSF allotment. In this case the BP project manager serves as the AAA and
retains R.S. 3679 responsibility for the CMAs he has established. NSF
obligations become simultaneous expenditures when the AAA/BP manager
is notified that disbursements have been charged against this type of
allotment. [Ref. 12: p. 96]

As discussed in section F, BP managers at Navy ICPs execute their
obligational authority directly by procuring the "wholesale" material

assigned to the Navy and in turn to the BP managers for management. The ICP normally delegates this execution responsibility to various sections of the ICP in the form of operating targets (OPTAR) and then tracks by month the status of the OPTAR assigned to each element. The ICP project manager maintains R.S. 3679 responsibility in this case. [Ref. 13: p. 98]

A monthly consolidated report of NSF execution which sums the specific allotment reports, CMA status reports and internal obligational accounting for each BP is provided by the respective project manager to NAVSUP by means of a Project Control Ledger Summary Report (NAVSUP Form 1091). A NSF summary report, which combines all BP 1091 reports and summaries of Treasury cash transactions for each BP, is prepared and forwarded via CNO/NAVCOMPT to OSD/OMB to officially report the execution status of the NSF apportionment. [Ref. 13: pp. 98,100]

2. Financial Inventory Accounting

Financial inventory accounting in the NSF was established by the National Security Act of 1947 which required that financial records or accounts be maintained on all material held in store by military departments [Ref. 21: p. 22]. NAVCOMPT 034000.2 lists the following as additional purposes of Financial Inventory Accounting and Reporting:

to ensure the integrity of stock funds and to maintain similar financial safeguards over material acquired under other appropriations.

to provide a source for the preparation of stock fund statements and status reports of appropriation financed inventories for submission to the Deparment of Defense.

to furnish inventory managers with essential financial data for budgetary requirements. [Ref. 21: p. 23]

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Although the NSF cash account is centralized at the NAVSUP level, NSF inventory is decentralized and financially accounted for at each stockpoint. The source of the reported value of the inventory is the Financial Inventory Report (FIR) which essentially starts with the month's beginning inventory balance in financial terms (valued at NSF standard prices), adds inventory receipts, subtracts inventory expenditures and displays the month's ending inventory value [Ref. 13: p. 101]. (More detail regarding the FIR can be obtained from Schick's Naval Postgraduate School masters thesis, "An Analysis of the Financial Inventory Reporting Structure", December, 1982.)

The daily financial transactions at the stock point are recorded in Financial Inventory Control Ledgers (FICL) and are maintained by the stock point's Authorized Accounting Activity (AAA) or Financial Information Processing Center (FIPC). The FICLs are summed monthly to make up the FIR which is forwarded, along with associated billing documents, to the appropriate Fleet Accounting and Disbursing Center (FAADC), with a copy to the respective BP manager. To ensure that the balances of the financial records match the value of inventory on hand or in store, the FICLs are matched with the Master Stock Inventory Records (MSIR) on a quarterly basis. Differences are accounted for and corrected during this "reconciliation" process. When the activity FIRs are received, FAADCLANT and FAADCPAC combine them, register charges to the NSF customers and forward summaries to NRFC Washington for their use in revolving fund accounting [Ref. 14: p. G-21].

It should be pointed out here that under the Centralized Accounting and Billing (CAB) system which is operated by ICPs, the larger stock

points, such as NSC San Diego, are not required to do FIR reporting and
billing for Navy managed (wholesale) material held in their main stores.
ICPs maintain the FICLs for this material and prepare the summary FIRs
and billing documents for submission to the FAADCs. These stock points
do, however, submit daily inventory Transaction Item Reports (TIR) to the
ICPs, which are part of a separate inventory management system, and
provide the information required by the ICPs to prepare the FIR.
[Ref. 13: p. 104]

3. Revolving Fund Accounting

Revolving fund accounting for the NSF is performed by NRFC,
Washington D.C., and establishes the NSF as a fiscal entity. Financial
inputs received from the Treasury Department, the obligational
accounting system, the financial inventory accounting system and other
sources, are used to prepare an income statement and balance sheet for
the NSF. Figure 3-8 shows a typical NSF balance sheet [Ref. 14: p. G-18].

Assets	Liabilities
Cash	Accounts payable
Accounts Receivable	
Inventory	Equity
Material in transit	Corpus
	Net Earnings

Figure 3-8 NSF Balance Sheet

The two principal assets listed on the NSF balance sheet are cash and
inventory. The inventory value is provided to NRFC by the monthly
Financial Inventory Reports prepared by the AAA/FIPC which is added to a

centrally produced FIR to account for the inventory value of NSF material
which is in transit between stock points. The cash asset is the
theoretical cash balance held in the centralized Treasury cash account
(17X4911) which is established for the NSF. This cash account is
affected by all daily NSF collections and disbursements which are
reported by disbursing officers at the various supply activities, acting as
agents of the Treasury Department. Material-in-transit (paid for from
cash but not yet received) value is derived from the monthly obligational
accounting reports and total accounts receivable (material issued from
inventory but not yet paid to cash) are obtained from reports submitted in
conjunction with those reports. The accounts payable liability (material
received but not yet paid for from cash) is also derived from the
obligational accounting reports. Two capital equity accounts are
maintained: the Corpus and Net Earnings. The Corpus represents the
initial capitalization of the fund plus or minus any alterations made by
Congress since its inception. Net Earnings represents cumulative gains or
losses from operations. [Ref. 14: pp. G-17, G-18]

I. RECENT DEVELOPMENTS

1. Depot Level Repairables (DLRs)

Prior to 1981 the NSF initially financed only secondary expense
items. The remainder of the supply system principal items and secondary
DLRs were funded by procurement appropriations and were issued to
customer activities on a free issue basis. As the result of a Department
of the Navy study released on 15 August 1979 entitled, "Depot Level
Repairables-An Analysis of Current and Alternative Methods of Funding," a

test program was commenced on 1 April 1981 which changed the
financing of Navy managed Non-Aviation DLRs from procurement and
centrally managed O&M,N appropriations to the NSF. The study concluded
that this shift should be undertaken for the following reasons:

--Improved supply system discipline resulting from the
buyer-seller relationship inherent in a stock funded
environment vice the current free issue procedure.

--Improved financial flexibility due to the ability to tradeoff
procurement and repair during budget execution.

--Improved budget forecasting due to shorter stock fund
budget leadtimes.

--Improved material support responsiveness due to the stock
fund's ability to respond to emergent requirement without
the need for reprogramming action. [Ref. 22: pp. 1-3,1-4]

The test program of Budget Project 81, managed by SPCC in
Mechanicsburg , Pennsylvania, was appraised as a success in an August
1983 Navy evaluation report which cited significant improvements in
readiness due to the increased availability of material gained through the
addition of Non-Aviation DLRs to the NSF [Ref. 13: p. 108]. Non-Aviation
DLR availability increased by 30% during this period while Aviation DLR
availability increased by only 5%. In addition increased carcass return
rates from customers of Non-Aviation DLRs resulted in a $300 million
cost savings. [Ref. 23: p. 1-5]

Due to the success of the Non-Aviation DLR program the Navy
commenced another test program on 1 April 1985 to evaluate NSF
financing of Aviation DLRs. These items were capitalized into NSF

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Budget Project 85 under ASO management with the evaluation scheduled to be completed on 30 September 1988. [Ref. 13: p. 108]

2. NSF Financing of Ship's Overhaul Material

Naval Shipyards are financed by the Navy Industrial Fund (NIF), a working capital fund which, unlike the NSF, cannot use contract authority to procure required supplies. Prior to FY83 the funds required by the NIF to obtain materials with long procurement leadtimes for a ship overhaul were budgeted for in customer operating appropriations in advance of the first fiscal year of the overhaul. In Program Budget Decision 623 of 21 December 1981, Congress reduced the O&M,N budget by $82.7 million and directed that the Navy use the NSF to procure the advance material for the Fleet Modernization and Maintenance Program. [Ref. 24] The NIF in effect gains the use of the NSF's contract authority and the NSF is reimbursed for the material from customer operating funds in the actual fiscal year the overhaul is commenced [Ref. 13: p. 111].

Budget Project 23, under the management of SPCC in Mechanicsburg, Pennsylvania, was established to finance the ship overhaul material which is carried in a Special Accounting Class 233 Financial Inventory Control Ledger (FICL). This material is reported as BP23 inventory until requisitions are placed for the material during the fiscal year of the overhaul. [Ref. 25]

3. Inventory Augmentation Appropriated Funds

Appropriated funds must be authorized by Congress before the NSF can procure additional material for the inventory augmentation and mobilization stock programs. Prior to FY83 the requirement to obtain newly appropriated funds did not exist for inventory augmentation. The

NSF enjoyed relative freedom in increasing stock levels by using its cash
for procurement from commercial vendors. Congress took exception with
the NSF process and began to impose restrictions on the NSF's ability to
increase its inventory levels. [Ref. 14: p. G-26] The 1982 and 1983 DOD
Appropriation Bills highlighted these restrictions:

> We do not believe that sizeable build-up in stock fund inventories
> should be accomplished through the pricing mechanism. Instead DOD
> should request direct appropriations into the stock fund.

> The Defense Department is placed on notice that future reductions
> will be considered to the extent that (DOD) violates the directive that

> cash available in the stock fund is not to be used for inventory build-up
> for force expansion or new weapons systems. [Ref. 17].

Congress, thus, has mandated that no stock funded requirements
which represent increases in approved levels of inventories can be
executed without congressional approval. Inventory augmentation
includes initial and follow-on system stock for new weapons systems,
outfitting for NSF activities and any special initiatives that increase
safety levels or insurance stocks. Since NSF inventory augmentation
requirements are now funded through congressional appropriations, these
requirements must be included in the annual budget submissions, and are
therefore subject to the normal two year gap between identification of
the requirement and receipt of funds to execute the program. [Ref. 17]

IV. CURRENT NAVY STOCK FUND CASH MANAGEMENT PRACTICES

A. CASH MANAGEMENT CHALLENGE

Major emphasis has been placed on cash management within the Federal government during the past fifteen years. Numerous instructions and directives (listed in Table 1) have been generated to aid in controlling the timing and flow of Treasury cash. In addition to cash flow, the cash balances of certain Federal operations have been targeted as areas for potential cash management improvement. Due to the revolving nature of the Navy Stock Fund, cash management translates to control of both cash flow and position. It should be noted that, while purchasing and inventory control is primarily decentralized to the Inventory Control Point (ICP) and Navy stock point level, cash management is highly centralized within the NSF at NAVSUP and NAVCOMPT. Below this headquarters level there is an awareness in cash management but little genuine control or concern.

The overall objective of minimizing Federal "cash" held outside the Treasury has been strenuously pursued throughout the Federal government in an effort to minimize the need to borrow additional funds. "Cash", in this context, is not the hard currency which normally comes to mind but is rather the obligational authority set aside for specific agencies' use. In the case of the Navy Stock Fund, this authority is appropriated to OSD and then apportioned to the various DOD Funds--NSF being one of the latter.

NSF's theoretical objective for cash management is to "break even" by
having revenue equal to expenses. "Break even" denotes a zero balance
cash position. The difference between the revenue and the expenses
(collections and expenditures), is called outlay and it is to this outlay
target that NAVSUP and NAVCOMPT manage their cash. In reality, the NSF
cash balance objective is set to provide for a cushion of 11 days of
operations (a "massaged" value based on average daily disbursement rate)
and ensure against a negative ending cash position in any given month.
This 11-day target is a temporary reduction from a 15-day DOD policy and
was directed by the House Appropriations Committee. The direction has
been promulgated by OSD via Program Budget Decision (PBD):

> The approved stock fund programs will result in cash balances in
> both fiscal years that approximate an 11-day cash objective. Athough
> the cash balances are postured at 11 days as they were in FY 1984, no
> change to the Department's policy pertaining to the 15-day cash
> objective is recommended due to the lack of sufficient experience at the
> lower cash level. Additional experience is necessary to validate an
> 11-day cash objective. [Ref. 26: p. 1]

> The House Appropriations Committee directed the department to
> operate on the basis of an 11-day cash objective in FY84 [Ref. 26: p. 2].

While the Navy and the Air Force expressed concern over this lower
level, their stock funds remained solvent in FY84 and DOD policy
continued at the 11-day level for FY85 and FY86. Any cash held in excess
of the 11-day level therefore represents lost economic opportunity,
possible unreplenished stocks, and potential transfer by higher authority-
a loss to the Navy which can result in a "loss of program" (e.g., this
money could be used elsewhere to procure a new ship or system.)

In the spirit of minimizing Treasury cash held outside the Department, Mr. Bob Davis, a member of the House Appropriations Committee Staff, suggested that the NSF cash objective be reduced to 7 days vice the 11-day target. NAVSUP's answer observed that a 7 day operating cash objective (approximately $190 million based on operating cash, massaged for average daily disbursement rate) could be completely eroded by as little as 1% variation in the nearly $18.5 billion through-put (sum of expenditures and collections). With the uncertainty and risks involved the Navy concluded that, ". . . any reduction to existing cash balances is not considered prudent by the NSF manager." [Ref. 27]

The NSF cash management challenge then is to minimize cash position to the directed 11-day objective while controlling the flow of cash and, most importantly, providing the best possible continued support to the Fleet.

B. CASH MANAGEMENT CONTROLS

Actual controls over the balance and flow of NSF cash are rather limited. Controls do exist in both the short and long term, however most of them are severely limited in scope and application. Short term refers to the current year when Stock Fund managers are executing the budget that has been approved and "locked in". These controls would ideally be exercised when the cash balance is observed to be increasing or decreasing at an undesirable rate. Long term expands the time horizon to contain the "out years", the next two years in which fiscal year budgets are in various stages of preparation and approval. The following is a list

of these controls, each of the which will be discussed along with their associated problems and potential for useful control:

Short term:
1. Loans or transfers
2. Adjust standard prices and/or surcharges
3. Alter rates of transactions or processing
4. Restrict obligational authority

Long term:
1. Forecasting
2. Set standard pricing
3. Transfer of item management between funds

1. **Short Term**

The short term controls listed above appear on the surface to give the stock fund manager many ways to influence and manage cash during the current period. In fact this is not true.

a. Loans or Transfers

Loans or transfers of cash to or from the Defense Stock Fund (DLA managed), other military stock funds (Army, Air Force, or Marines), or an appropriation (i.e. O&M,N) can and have been used in the past to support a particular fund's position. A loan, however, is only a temporary solution which will have to be paid back. Transfers between stock funds are no longer an option. Congress has mandated that the stock funds be self-sufficient and interfund transfers of cash are no longer allowed.

. . . Congressional limitation that prohibits transfer of funds from one working capital fund to another. This restricts flexibility which was available until recently in that stock funds cannot now rebalance cash resources when they become inadequate. [Ref. 27]

DLA, which has historically had excess cash (for reasons which will be discussed later), has been the source of many of these transfers. Transfers between appropriations (i.e. reprogramming between O&M,N and Navy Stock Account (NSA)) are not allowed without specific Congressional approval. [Ref. 17] In FY85, a transfer of $194.5 million was made to O&M,N from the NSF. As a result of a $300M budget mark against FY86 O&M,N the NSF is transferring $300M to the customers' O&M,N account, with Congressional approval. [Ref. 28]

b. Adjusting Standard Pricing

The second short term control, adjusting the standard pricing of items, seems like a perfect tool for controlling the cash position and flow within the NSF. Private business uses this tool quite well to adjust their sales to desired levels in order to maintain sales volume and control their inventory. Unfortunately, this option is not open to stock funds. Standard prices and surcharges are fixed at the OSD level and cannot be changed (with only minor exceptions) during the execution year. This is done to ensure a stable financial environment and to protect the budgeted "program". Surcharges are either a function of the pricing/budgeting process or are handed down from the President's budget via OMB. A recent example is the computed 10.2% price reduction in FY87, established to "burn down" a projected $930M cash excess in that year. Pricing and budgeting will be addressed in more depth in Section G of this chapter.

c. Adjusting Transaction Rates

The third short term control of slowing down or speeding up transaction and processing rates would allow a short term fix for cash in those Budget Projects with shorter Financial lead times (FLT – the time between obligation and expenditure). Some believe that, to a small degree, these activities take place. Once again though, this is not a viable option. Legislation such as the Prompt Payment Act and the Deficit Reduction Act set firm limits and guidelines on the timing of billings and disbursements. There are some improvements yet to be made in these areas, specifically in interest charges for delinquent payment of bills.

d. Restricting Obligational Authority

Finally, restricting the obligational authority of inventory managers and stock points would serve to slow the obligations and expenditures in the short run but the potential for degraded support to the Fleet is very high. If an inventory manager could not afford to replenish stock in a particular area, stockouts would occur and the availability of those items would drop drastically, creating an unsatisfactory supply and readiness environment. It is virtually impossible to measure the cost of such a stockout, especially in a crisis situation.

2. Long Term

a. Pricing and Forecasting

Long term controls are different in that they offer the stock fund manager some degree of actual control on NSF cash. It is generally agreed that pricing is the primary cash management tool for the NSF. Further, NAVCOMPT sets the prices as noted by Captain E.M. Straw, Deputy Commander, Financial Management / Comptroller at NAVSUP:

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Cash adjustments to the NSF are a NAVCOMPT responsibility and will be implemented via the NSF pricing mechanism [Ref. 29].

While pricing is certainly a main control mechanism, the more fundamental, and therefore more critical control, is the ability to forecast the cash position and predict the various factors that enter into the pricing equation. The forecasting process is the basis of pricing. The entire pricing structure is dependent on the accuracy of forecasts of cash position and the various accounts and transactions that affect NSF cash. Forecasting and pricing will be discussed in Sections F and G of this chapter.

b. Transfers of Item Management

The third long term control is the actual transfer of item management between stock funds. For several years fast turnover, high volume items have been transferred to the Defense Logistic Agency after being procured and financed by the NSF. The rationale behind this Consumable Item Transfer (CIT) lies in Economic Order Quantity savings, more centralized control of common items, and a desire to cut down the workload at Navy ICPs [Ref. 30]. The impact on cash is that DLA receives a sizeable amount of inventory without expending funds. On the other hand, the NSF finances this inventory for DLA but receives no revenue from the material. This has resulted in DLA having an excess of cash (having received the collections without having made the expenditure). By nature of this cash generating potential, item management could theoretically be shifted as a cash management tool in order to counter low cash balances or slow cash flow situations. This would be a massive

undertaking, requiring large amounts of time and effort, and would yield an uncertain outcome. In addition, a recent freeze has been placed on item transfers, specifically to DLA, in an effort to further assist stock funds become self-sufficient. This freeze cannot be lifted without approval of the Navy Comptroller's office. Prior to lifting this freeze, a method of financing such transfers must be found to avoid the cash windfalls or losses experienced in the past. [Ref. 28]

Short and long term controls do exist. The control in the short term is effectively limited to the sometimes difficult task of a Congressionally approved transfer of funds with the other options being either unavailable or ineffective in current stock fund operations. The long term controls of forecasting and the resultant pricing mechanisms are the only real controls available to stock fund managers. Information for forecasting and pricing comes from all levels, yet the responsibility, and therefore the real control, lies at the headquarters level within NAVSUP and NAVCOMPT.

C. BILLINGS AND COLLECTIONS

The Federal government has identified billings and collections as areas for cash management attention. The primary aspect of these areas which impacts on cash is in the timing of the transactions; by speeding up both billings and collections one can minimize the amount of cash held outside the Treasury cash account and reduce the amount of borrowing. Legislation and directives including the Prompt Payment Act, Debt Collection Act of 1982, Treasury Fiscal Requirements Manual (TFRM) Chapter 8000, and Treasury Circular 1084 give specific direction for the

timing of billings and collections. Billing must be initiated within one working day of the billing department being advised of completion of service or the release to shipment of the goods being paid for. Payment due dates and interest penalties for late payments must be included in writing along with the invoice. In general, payments will be due within 30 days of receipt of a bill.

Various systems exist for speeding up the actual collection including: 1) lockbox; and 2) electronic funds transfers (EFT) via the Treasury Financial Communications System (TFCS). The latter is particularly effective in forwarding funds to the Treasury because it eliminates both the handling and clearing delays of checks and makes funds available on the same day.

While these methods and systems are effective in speeding up the collection of cash at the Federal level, they do little for cash within the NSF structure for the following reasons: 1) the vast majority of transactions between the NSF and the Treasury are simply accounting entries (within the Treasury) that do not involve cash; 2) the portion of transactions that is made up of hard cash consists primarily of ship's store and commissary receipts; 3) other Federal agencies (i.e. the Coast Guard), and private parties (contractors using NSF material in their production efforts), and foreign sales are issued material under cash sale procedures; and 4) the rest of the transactions are serviced through either Intra Navy or Inter Department of Defense transfers which result in "immediate cash" collections into the financing appropriation.

Intra Navy and inter departmental transactions are described as follows:

Intra Navy collections are accomplished by the use of the Report Fund Authorization Charges (NAVCOMPT Form 2074) with related detail accounting cards to the customer and an equivalent Labor/Roll Material Charges and Credits (NAVCOMPT Form 2051) to the Fleet Accounting and Disbursing Centers (FAADC) for registering to Treasury.

Inter Department of Defense collections are processed via the interfund billing process. Cash collections are effected based upon Summary Billing Cards and supporting details provided to the customer and exact copies which are used by the FAADC to register the collections from other Service's funds. [Ref. 30]

Both of the above result in theoretical "immediate" cash in that the NSF cash balance is incremented as soon as the data is recorded via the registering cycle. This normally is completed within a one month window.

Several notable exceptions have been cited in recent history which raise questions as to the blanket validity of "immediate cash". Problems have been noted in general processing delays, reporting lags and estimate errors, CMA accounting and reconciliation between financial and inventory accounting systems. These will be addressed further in Chapter V.

D. DISBURSEMENTS

The impact of disbursements on cash management is similar to that discussed in the previous section. The same directives govern the timing of payments for procurement to contractors. The Prompt Payment Act directs payments to be made on time, not early or late, in order to take advantage of any discounts and to avoid financing contractors' operations. Prior to this act, standard practice was to make payments within a few days of receipt of the bill. Implementation therefore resulted in a cash

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excess of several weeks worth of expenditures which were delayed until the thirty day limit. At the same time this legislation established interest charges as penalties for delinquent payments.

The same inter/intra fund mechanisms mentioned in Section C are used for disbursements between funds. Actual payments for procurement are made by the FAADCs and NRFC as described in Chapter III. This rather complicated process suffers from "too many hands" and is unnecessarily lengthy. DOD branches have made great strides in decreasing the amount of "late interest" payments, but the Navy maintains its unenvied position as the branch paying the highest percentage. Figure 2-5 shows the relative level of interest payments for each of the Armed Services. Command attention from all levels has been directed toward this problem area and improvements are being made. However, some feel that the Navy has gone beyond the point of marginal return in that the cure is costing more than the ill. Perhaps by establishing a decentralized disbursement authority, a number of the steps in the payment process could be eliminated with a resultant decrease in the time involved.

E. DEPOSITS

The goal of Federal cash management is to expedite the deposit of funds, minimizing the need to borrow and the resulting interest payments. TRFM Chapter 8000 and Treasury Circular 1084 address funds deposit and specify both the frequency of deposit (when total cash equals $1000 or at least once a week) and the timing of deposits (as early in the day as possible). Again, TFCS, EFT, and Lockbox are all methods to support this effort.

How big is the impact of these systems within the NSF? As stated above, the vast majority of "deposits" are inter/intra fund transfers in which the money never leaves the Treasury. Deposits by Disbursing Officers of receipts from ships stores, commissaries, and collections from contractors and Foreign Military Sales (FMS) are generally made expeditiously via bank drafts and are sufficiently small so they are not a major concern to the NSF managers. Certainly, continued attention should be given to these areas at the Disbursing Officer level in the interest of good cash management practice.

Note that the revolving nature of the NSF actually returns deposits to the Navy Stock Fund Cash Account vice the Treasury's General Cash Account. Therefore, the advantages of the TFCS and lockbox systems are somewhat negated. Transfers of cash from the NSF generally flow to other Navy accounts (usually O&M,N) in order to conserve Total Obligational Authority (TOA) and maintain programs. When funds are transferred out of the Navy they go into DOD where they may be re-apportioned to other stock funds or appropriations. DOD may, on the other hand, give funds back to the Treasury.

In summary, the Navy Stock Fund managers are operating effectively in the areas of billings and collections, disbursements, and deposits. They are following the regulations governing these areas and have made progress in improving NSF cash management. Although continued efforts are paying off, some fine tuning is always possible. Areas for potential improvement will be reviewed in the next chapter. The primary cash management tool, the pricing mechanism, is dependent on the subject of the next section, forecasting.

F. FORECASTING

Forecasting cash position and flow can be a frustrating and costly venture. It is difficult at best and sometimes nearly impossible. Often there is little direct incentive to undertake the task, but it is a fundamental part of good cash management and must be given the attention it requires. Because end-of-year cash balances have been significantly different from predictions, the process of forecasting NSF cash has received high levels of attention. Uncertainty is the name of the game and common sentiments among NSF cash managers are reflected in phrases describing the forecasting process as "more coincidence than design" [Ref. 31: p. 6] or more simply, "Lots of luck is involved" [Ref. 17]. Because forecasting has a critical impact on cash management, continued efforts are underway to "fine tune" the process using advances in statistical methods and data processing. The question must eventually evolve to what level of accuracy is desired and at what cost. This section will address the need for forecasting, the basic structure of NSF cash forecasting and the various factors and trends that influence the Navy Stock Fund's cash.

1. Importance of NSF Cash Forecasts

Pricing has been identified as the primary management control mechanism within the NSF. The cash forecast is the single most important input to the entire pricing process. In addition to their importance in pricing, the cash forecasts provide the basis for the present management evaluation criteria. As stated before, NAVSUP manages to an outlay target, the difference between the collections forecast and the expenditures forecast. ICP level managers are tasked

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with "managing to the deviation", the difference between customer orders and obligations. Both orders and obligations values are intimately tied to the cash forecasts.

Beyond the pricing base and the establishment of management targets, another important use of the forecasted information lies in the NSF budgeting process. The FY87 input for the President's Budget submission has been generated more than two years prior to execution. A single number estimate must be made for the end-of-period cash position included in the Navy Stock Fund budget submission to OSD. This figure is generated through the forecasting process, and is the basis of all NSF operations planning. Note that at least five formal reviews of the forecast take place between the original budget submission and execution.

The importance of accuracy in these forecasts is implicit in their applications. Further, striving for improved forecasting has been an ongoing effort. Concurrent with a Navy Audit Service review of NSF cash in 1976, NAVSUP contracted for development of a NSF financial forecasting system (Office of Naval Research contract N00014-72-C-0266). One purpose of this system was to enable prediction of cash balances. The results of a 1976 follow-on study will be discussed later in this section. The accuracy of the NSF forecast for FY84 and FY85 is reflected Table 8 [REF. 32,33]. As can be seen from the table, forecast errors for disbursements are running significantly higher than for collections and the outlay target is being missed by factors of 5.5 % to 14 %. These are significant variances and, given the total amount of funds in the NSF, represent a large amount of cash. The $588 million

TABLE 8

NSF CASH ERROR RATES FOR FY84, FY85

(amounts in $ millions)

FY 84	Forecast	Actual	Error	% Error	%Throughput Error
Disbursement	7336	6449	(887)	(14)	(7)
Collections	6825	6488	(337)	(5)	(3)
Outlay	511	(39)	(550)	1410	4
Throughput	14161	12937	(1224)	(9)	(9)
FY85					
Disbursements	8420	7150	(1270)	(18)	(9)
Collections	7939	7257	(682)	(9)	(5)
Outlay	481	(107)	(588)	550	4
Throughput	16359	14407	(1952)	(14)	(14)

[Data compiled from actual FY84 and FY85 data]

cash excess in FY85 represents a good deal of "program" not bought by the Navy and, in the macro view, a large sum that the Treasury would not have had to borrow if the forecast had been closer.

This is not to say that the NSF managers are not working diligently to improve accuracy in forecasting cash. There are factors and forces that interplay to make these forecasts difficult. As these factors are better understood, identified, and where possible quantified, the cash forecasts should improve accordingly. This is an ongoing problem and a concern at all levels of NSF management.

2. Cash Position Forecasting

When designing a cash position forecasting model it is only logical to pattern it after the actual process. The true test of the validity of a forecast model is its accuracy. In addition, it is desirable, in the interest of human understanding and acceptance, to closely reflect the actual flow of cash. All of the existing cash forecasting models which were reviewed were similar and fairly representative of NSF operations.

The NSF cash equation is patterned on simple accounting: end-of-period cash being equal to the beginning cash balance + collections – expenditures + appropriations +/- any transfers. Collections, or current year sales, are made up of several accounts (customers orders, unfilled customer orders, changes in unfilled customer orders, sales, etc.) combining in patterns predicted by the ICPs. These patterns are based on historical and/or projected demand, escalation changes, and program changes such as operational tempo, outfitting schedules, and customer budgets.

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Expenditures are forecast at the NAVSUP level and are derived principally from the expected obligation program, historical expenditure rates (adjusted for predicted trends), financial lead times, and projected new program starts (i.e., DLRs or Long Lead Time Material). Transfers and appropriations are planned.inputs but depend heavily on political vagaries and factors well beyond the control of the NSF managers. These factors will each be discussed separately in the following sections. The most detailed presentation of the various cash equation elements and their uses was found in the 1976 study conducted by Control Analysis Corporation which yielded the "Navy Stock Fund Financial Forecasting Model". Appendix A is an excerpt from that study and displays the 15 accounts and transactions used by that model.

a. Demand Forecasting

All the forecast models reviewed started with the forecast demand as the critical input for the collection side of the cash equation. Both NAVSUP and NAVCOMPT NSF managers stated that the sales and collections predictions, and therefore the demand forecasting, were "pretty good". Demand forecasting begins with a forecast of customer orders based on historical demand and program requirements. These forecasts are then used to determine the end of period inventory and on-order requirements necessary to support the level of customer orders anticipated during the next fiscal year.

The entire demand forecasting process is quite involved and has received a great deal of attention and analysis. The problem of demand forecasting is compounded by the need to look at both provisioning for new systems and replenishment for existing systems. Within each of

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these categories the sub-categories of wholesale and resale must be considered. Also, both consumables and repairables must be analyzed. DODINST 4140.42 and NAVSUPNOTE 4441 (15 July 1983) address requirements determination and range and depth of support, respectively. The ICPs are tasked with conducting this forecasting effort and integrating it with their inventory control programs.

The Navy inventory models compute procurement and repair levels for individual items of supply. These tasks are accomplished through a complex group of computer programs, collectively known as the Uniform Inventory Control Program (UICP). The UICP programs collect and manipulate data; forecast demand, lead times, repair times, and variances; and compute procurement and repair levels. These outputs are driven by mobilization and lead time requirements, safety levels and operating levels of supply, or economic order quantities [Ref. 34: p. 3-24]. ICP budget analysts look at recurring demand, historical demand, survival time, and administrative and production lead times in generating their demand forecasts.

Administrative lead time (ALT) is "the time it takes to award a contract, measured from the time the need for procurement is initially established." [Ref. 35: p. 31] Production Lead Time (PLT) is "the expected span of time between the date of the award of the procurement and the aggregate average time of first receipt at all stock points in the distribution system." [Ref. 35: p. 32] The first receipt refers to the first "significant" delivery made to a stock point. Together the ALT and PLT comprise what is called the Procurement lead time. Financial lead time, mentioned before, is actually PLT plus a follow-on period of time from

receipt of the material to the expenditure registered when the bill is paid. Historical data bases are maintained at the ICPs for 5 years. Various default values, ranging from 5-7 quarters, are used if no lead time history is available. Manual adjustments by the inventory manager are possible to allow for actual delivery experience, contractual delivery schedules, or written contractor-furnished estimates. These can be entered into the data base and used at the item manager's discretion. When contractor estimates are used, each ICP then adds a receipt and processing time (13 days at SPCC, one month at ASO).

SPCC employs industry standards for PLT generated by NAVSEA Shipbuilding Support Office (NAVSHIPSO) which uses market indicators for monitoring fluctuations in lead times. They conduct surveys on manufacturing lead times and production rates to identify industry standards, particularly for critical items, long lead time items, sole source, foreign source and short supply items. [Ref. 35: p. 35]

Budget requirements are calculated by ICP budget analysts who attempt to validate the planned requirements. They employ "levels" programs to read the historical demand data, exponentially smooth the observed quarterly demand, and, with the aid of Cyclic Levels and Forecasting (CLF) data sheets, they weight the entries to compute their requirements estimates. (ASO uses equal weights while SPCC uses higher weights for the more recent entries). Once again, the item manager is allowed a judgement input based on his best guess to either adjust or completely override the program. Inventory costs for items are based on the last buy recorded.

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With over 540,000 Navy managed items in the NSF inventory the item managers cannot conduct this type of review for each line item. Instead, they set parameters and tolerance thresholds. If a level prediction falls outside the thresholds, the item manager notes the item, conducts the review and makes any necessary adjustments.

Significant work has been done in demand forecasting by all services. Time series vs. causal forecasting methods have been researched for determining better Economic Order Quantity models [Ref. 36: p. 20]. Non-parametric forecasting models have been reviewed in an effort to fine tune inventory control programs such as the Aviation Afloat & Ashore Allowance Analyzer (5A) wholesale inventory analyzer at ASO and the Ships Supply Support Study inventory simulator at SPCC. These studies have used actual historical data from Transaction Item Reporting (TIR) files, 7 years worth at SPCC and 5 years worth at ASO. [Ref. 37: p. 7]. Estimations of shortage costs, a major factor in any EOQ model have been conducted looking at time/essentiality weightings with long term intentions to include these factors in the resystemization improvements for data processing within the NSF [Ref. 38: pp. iii-iv]. Statistical analysts, using tools such as histograms, chi-square tests, and mean squared error measurements, have determined that a Bernoulli - Exponential distribution has the best relative fit for lead time demand [Ref. 39: p. ii]. The above are just a few of the areas being investigated in the ongoing effort to fine tune the demand forecasting process. These processes will no doubt improve as these efforts continue.

b. Collections

The NSF responds to funded requisitions from customers called customer orders. When the requested material is issued and a corresponding transfer of funds is registered, a sale has been made. For DOD customers using the intra/interfund transfer system, this sale represents an immediate cash collection. For customers outside of DOD, the collection usually lags for a brief period as an accounts receivable for the NSF. When the requested item is not available, an unfilled customer order exists until the order is filled. This unfilled customer orders account is carried over each year while the sales account is closed out at the end of each Fiscal Year.

Through the course of the year, the NSF accumulates collections from sales and liquidating the unfilled customer orders. Final collections equals the sales plus any decrease in the unfilled customer orders or minus any increase in unfilled customer orders.

Most stock fund budget and management reports deal with the term "customer orders" while the term "collections" is used for cash transactions and forecasts. Budget Project (BP) sales are derived from the ICP's demand forecasted customer orders. They are then aggregated to the total NSF level and adjusted for expected monthly changes in accounts receivable and special collections (i.e. transfers from O&M,N) to produce a forecast of monthly NSF collections. This rather mechanical prediction, based primarily on the demand forecast, represents one side of the cash equation and is taken at face value by NAVSUP and NAVCOMPT NSF managers. As was seen in Table 8, the collections predictions for FY84 and FY85 were 5% and 9% of actual collections, respectively.

c. Obligations

The next step in developing a forecast model is to generate NSF obligational requirements by comparing the inventory assets with the forecasted demand. This is carried out through the semi-annual "stratification" process. Stratification is really nothing more than matching the on-hand and predicted inventory with the predicted requirements, by line item. This matching takes place twice a year, on 31 March and 30 September. Several times each year, during ICP on-site reviews with all interested parties (NAVSUP, NAVCOMPT, NAVAIR, NAVSEA, etc.), 150 - 175 items are reviewed in an effort to audit what the analysts have done. A Supply Demand Review (SDR) program is run weekly for consumables and monthly for repairables. This program yields a recommended procurement order of the deficit up to the reorder level, plus an Economic Order Quantity. These buying orders are actually predicted obligations. Once again, a fundamental factor is derived at the ICP level from the demand forecast. As mentioned before, the ICPs manage to an Orders/Obligation deviation, so they take great care to predict these figures as accurately as possible.

Obligations are directly controlled by the item managers and therefore offer some form of control. This control is reflected in the periodic reviews and adjustments which are made to obligations during the budget cycle. A problem arises in the use of the outlay target as the management goal. Unfortunately, the outlay target is not computed using the obligations figure. This control is therefore not considered in measuring success at the NAVSUP and NAVCOMPT level. Commodore D.W. McKinnon, Vice Commander of the Navy Supply Systems Command wrote:

The flexibility within the NSF budget process permits obligation forecast adjustments as conditions change (e.g. sales, program changes, etc.) and this represents the major difference against the "official" plan. Outlays, on the other hand, are not as susceptible to management control since they are driven in large part by financial lead times. [Ref. 40]

Two other problem areas have been noted concerning obligations estimates. First, with the trend towards competition, a number of existing contracts have been reviewed and some obligations have been "re-definitized" at a lower level. This effort has resulted in a lower than projected obligation rate. As will be seen in the next section, this translates into a lower expenditure rate, which in turn yields an excess of cash. This "de-obligation" of funds is being tracked and future forecasts are, to a degree, being adjusted.

The second problem area involves seasonal phasing of the obligation distribution throughout the year in order to more accurately reflect the real world. Projections in the past have used straight-line estimates (1/12th of annual obligations per month) for the entire year and quarterly obligation patterns have been ignored. Both "de-obligations" and obligation phasing will be discussed further in Chapter V.

d. Expenditures

The final major component of the cash equation is the expenditures, or actual outflows of "cash", from the NSF. These expenditures are made up of payments to contractors for procured Navy managed wholesale material as well as transfers to DLA and other DOD stock funds for purchase of their retail material. The expenditure forecast is made up of two primary parts: 1) forecast obligations; and 2) financial lead time (FLT). FLT is the time between the obligation and the

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actual expenditure and is therefore a critical element in forecasting expenditures. If one accepts the validity of FLT, then the expenditure forecast is a reflection of the obligation forecast, delayed by one FLT. The accuracy of all previous forecasts leading up to the obligations is therefore of extreme importance.

There is no direct control over expenditures. Once an obligation has been recorded, an expenditure will follow. As a result, expenditure rates tend to be fairly constant over time. The critical question is therefore, "When will the bill be paid?" It is logical to assume that the obligation pattern will be reflected in the expenditure rate, as described above. Time no doubt dampens this relation so that a Budget Project with a long FLT would not show as strong a relation as one with a short FLT. If the timing of the "bubble", the reflection of a concentrated period of obligations, is missed by two weeks in September, the forecast for the whole year would be in error by a like amount with no time to correct itself.

This raises the question "How accurate are the FLT estimates?" The major component of FLT is the Production lead time (PLT). FLTs have been increasing over the past few years. As a result of FY84's excessive end-of-period cash balance, NAVSUP lengthened their estimates of FLTs in several BPs: BP14 from 12.0 to 16.1 months, BP34 from 16.5 to 16.7 months, and BP81 from 17.0 to 20.6 months [Ref. 41: p. 4]. The natural assumption was that the PLTs, unique to each contractor, were increasing and driving the overall increase in FLTs. Through a consensus of item manager inputs, it was determined that PLTs were in fact holding steady. This meant that the problem was either on the administration and

handling side or hidden within the outstanding obligations prediction. Both of these areas will be discussed later. It should be noted that four years ago the FLTs shortened which resulted in the "cash crisis of '82", evidence of the cyclic nature of FLTs.

If a model is constructed in a pure fashion, the FLT is an input based on historical data and adjusted for various trends and factors just as the other elements of the cash equation are. Virtually every factor which affects the forecast manifests itself in the FLT in one way or another. Competition, BOSS, longer PLT, and many of the other factors mentioned in the next section impact on the accuracy of FLT predictions. Additionally, different models are generated in slightly different ways which significantly impact on the FLT validity. These models, and the accuracy of the FLT estimates will be discussed in a later section.

The following section identifies many of the various factors that affect the forecasting elements discussed so far. Though the basic cash equation is, on the surface, simple, these factors make the NSF managers' task of forecasting stock fund cash extremely difficult.

3. Factors Affecting Forecasts

There are a number of factors which affect each other as well as impact the ultimate cash position. These have been grouped into the following six categories for the purpose of this discussion:

   a. Commercial Sector Economic Conditions
   b. Federal Policy and Congressional Direction
   c. DOD and Navy Policy
   d. NSF Structure Changes
   e. Accounting and Processing
   f. Other

Each of these areas will be discussed, with specific examples of the impact of the various factors which make up the categories. Additionally, a brief review of trends in some of the factors will be offered. Factors unique to the Depot Level Repairables (DLRs) will be addressed in the next section.

a. Commercial Sector Economic Conditions

This area is one of the most global in nature yet one of the hardest to quantify. The basic premise is that when the national economy is good, the commercial sector is less responsive to the Federal government. When sufficient private business is available, with no due dates or penalties, firms may stretch out their government contracts in order to devoted more effort to their private customers. This creates the situation where the Federal government is financing the firm's private sector business growth and operations. The direct impact on the NSF is manifested in longer production lead times which cause an equal expansion in financial lead times. Hence, these events cause an excess of cash due to delayed expenditures. The real danger in this situation is that it can reverse itself very rapidly and, if the NSF manager is not tuned to the economic environment, the PLT and FLT could begin decreasing. The NSF could be susceptible for a cash out condition if the trend is not caught in time. Given a rapid and severe enough shift, it is possible that nothing short of an injection of cash could salvage the solvency of the NSF. In BPs where lead times approach two years there is little near term control which can be exercised to prevent such a problem. One possible dampening action may be contracting for specific delivery

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schedules and locking in a PLT. With a known quantity for PLT, the FLT variable is significantly stabilized.

b. Federal Policy and Congressional Direction

Changes in policy and direction at the Federal and Congressional levels present a double problem due to their far reaching scope and potential to occur long after the forecasting and pricing controls can correct for them. Several recent examples of such situations highlight the affect of these changes.

The Prompt Payment Act was designed to take advantage of any discounts available for early payment of bills and to optimize the use of Treasury cash by not paying bills early. These changes have been made and the government is now saving money that previously financed private industry operations. A negative impact occurred when the Navy slowed payments for a three week period to adhere to the regulation. The Navy had previously paid bills as they were received. By stretching these payments to 30 days, a three week lag in expenditures produced an excess of cash. $30 million of expenditures are identified as having slid from FY84 to FY85 due to the slow down to 30 days [Ref. 41: p. 2].

Circular A-76 established competition as a watchword in procurement. The effort and attention given to ensuring competition has resulted in a slow down of both obligations (in the form of contracts) and expenditures. This slow down, without a similar decline in collections has invalidated projections and resulted once again in a cash excess.

General budgetary actions by Congress have potential for major impact on NSF cash in two ways. First, these actions tend to be far reaching in scope and address large dollar amounts. Secondly they can

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occur very close to or during the execution year, long after any management controls are left. An example would be the reduction of customer budgets (a cut in O&M,N) which necessitates an alteration of the pricing structure to balance to the new customer budgets. This action then negates the careful planning of the previous season in establishing prices which enabled the NSF to meet its required 11-day operating cash objective. Another case to consider is Congressional appropriations to Prepositioned Wartime Reserves or Inventory Augmentation. These funds are obligated and expended without offsetting collections. The net effect on cash is not a problem since the appropriations were unplanned income. However, the outlay target, used to measure NSF managers performance, is now skewed to the increased expenditure resulting in a higher outlay figure. The NSF managers have no control over these expenditures and therefore should not be judged against something they cannot change or influence.

Virtually every action of Congress dealing with the Navy impacts on the NSF cash. The "600 ship Navy" emphasis resulted in major expansion of the volume of the NSF. It is extremely difficult to attempt to quantify the impact of legislation such as the recent Gramm-Rudman Act or the proposal to spread naval bases throughout the U.S. These actions cannot be predicted, especially two years ahead of time. The best that the NSF managers can do is to have a model and a system which are attuned to these potential changes. These models must be adjustable for both trial runs, to assess the impact of these changes, and for actual altering of the forecasts as soon as the changes have been confirmed.

c. DOD and Navy Policy

SECDEF procurement and pricing initiatives reflect the competition "hysteria" and media attention that has been so prevalent in recent years. The results have been a slow down of obligations through delays on the bidding process as well as the review of existing contracts and the "re-definitization" of outstanding obligations at lower prices.

The impact of such initiatives can be seen in the "Buy Our Spares Smart" (BOSS) program. Many contracts for spare parts have been modified and "re-definitized" at lower rates. FY82 and FY83 contract reviews yielded savings of $100 million at ASO and $147 million at SPCC. The result was a $247 million reduction in FY84 outlays [Ref. 41: p. 2].

The validation of outstanding obligations (Obs Val) program has been ongoing at the ICP level for some time. Its purpose is to identify cancelled or false obligations. With the importance of the projected outstanding obligations to the forecasting process this effort has become increasingly critical. COMNAVSUP letter, dated 7 Mar 85, emphasized the need for continued vigilance in this area and lays out the reporting requirements. Table 9 shows the results of the FY83 and FY84 Obligations Validation program at SPCC [Ref. 42]

d. NSF Structure Changes

This category refers to changes in NSF operations and programs which impact on the cash flow and position. One of the most major changes in recent history is the addition of Depot Level Repairables (DLRs) to the NSF. The Aviation DLRs (AVDLRs, BP85) have been in the NSF for less than a year but the Non-AVDLRs (BP81) have been monitored for over 3 years. During this time there have been constant increases in

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FLT within BP81 which have made predicted expenditures for this BP greater than those actually experienced.

TABLE 9

SPCC OBLIGATION VALIDATION SCOPE OF OPERATIONS, FY83, FY84

(Dollars in $000)

	FY83	FY84
Contracts Reviewed	6,166	10,595
Value of Contracts Reviewed	$740,603	$2,435,500
Value of Unliquidated Obligations	$283,061	$1,625,792
Funds Released for Additional Requirements	$6,269	$63,200

An additional area of concern is the impact of the capitalization of AVDLR material which will begin in April 1986. There is a tendency for NSF analysts to inflate expenditure estimates in order to create a cash cushion to cover for this uncertainty. The FLT estimates are therefore probably conservatively low.

The uncertainty problem is not restricted to the expenditure side of the cash equation. Sales predictions are also a factor which must be considered. These problems have been identified and actions are planned to counter their affects. The Deputy Commander for Financial Management/Comptroller related in his Memorandum for the Record, dated 20 Apr 85:

> . . . that if NSF cash infusions are required as a result of AVDLR sales decline, it would come from O&M,N customer account. OP-921 was

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directed to maintain proper balance between cash and customer accounts relative to AVDLR sales. [Ref. 29]

Another structure issue is the migration of high volume, fast moving item management to DLA. This Consumable Item Transfer (CIT), as discussed earlier, results in expenditures by the NSF to buy material for which it will never see collections. DLA, on the other hand, obtains a windfall excess of cash. ASO alone predicted a $25.2 million drop in obligations and a $36.6 million drop in customer orders from scheduled transfers of 35,000 items to DLA management in FY 85 [Ref. 43: p. VI-4]. Unless these transfers are carefully forecasted, planned, and financed the impact on NSF cash could be disastrous. Again, this problem has been identified and there is a temporary freeze on CITs until an equitable system of financing can be found. Furthermore the Navy will not resume the CIT program without first running it through the proper channels. NAVCOMPT [NCB] must approve the restart of item transfers to DLA. [Ref. 44]

The introduction of Special Accounting Class (SAC) 207 ships to the NSF has compunded problems of missed reporting deadlines and Centrally Managed Accounts. These will be addressed further in Chapter V.

A major change to the NSF involved the establishment of BP23, Ships Overhaul Material. Through this Budget Project the NSF finances the lead time for these long lead time items. The problem of uncertainty surfaced again when the FY84 expenditures were $109 million less than projected. BP23 is still a relatively new program and the original

estimates called for 57% of the obligations to be expended within one year of obligation. In reality, the rate was only 15%. There was no historical data within the NSF and the cause was attributed again to expanding lead times. [Ref. 40: p.2] Further, BP23 is expected to be a continuing problem [Ref. 41: p. 2].

e. Accounting and Processing

Different BPs are susceptible to different errors. For instance, short lead time BPs (like BP28 and BP38) are more susceptible to billing and handling errors. It is not uncommon for the processing of collections or disbursements to be subject to the vagaries of data processing and its unpredictable problems. If a bill is delayed for 3 weeks due to mishandling or improper addressing and the FLT is only 1 month, the percentage impact on the cash position cause by not having received that bill is significantly greater than if the FLT was 20 months. The expenditure in the first case would have been expected within the 1 month window and the delay represents a 75% error in timing. The latter case results in less than a 4% timing error.

Another area of concern is the human factor; excessive workload, and simple human error. The latter will never be completely eliminated and must be considered at least as a random variable.

Administrative policies of other organizations, i.e., DLA, directly affect the NSF. For example, a delay in processing fuel bills, whether consciously decided or not, would impact the NSF expenditures. [Ref. 31: p. 2] Other specific accounting considerations will be addressed in Chapter V.

f. Other Factors

There are many other factors which should be considered in establishing a forecast for NSF cash. Two, which were noted in various sources, include: 1) phasing of obligational patterns; and 2) the complexity of new weapons systems. Prior to the review of FY84 excess cash problems, it was common to assume a linear obligation pattern, where 1/12th of the total obligations would be registered each month. Table 10 shows that a full 48% of the obligations for SPCC occurred in the 4th quarter [Ref. 45: p. 1]. While this is partially credited as a one time occurrence, it is true that the obligation rates are a function of

TABLE 10

SPCC OBLIGATION PATTERNS FY82-84

($ in millions)

	FY82	%	FY83	%	FY84	%
1st Quarter	$ 234	18	$ 147	10	$ 161	11
2nd Quarter	283	21	300	21	235	16
3rd Quarter	191	14	300	21	243	17
4th Quarter	622	47	668	48	811	56
Total Year	1,330	100	1,415	100	1,450	100

the fiscal year quarter. O&M,N money is available via an annual appropriation. When the 4th quarter arrives, the tendency is to "use it or lose it." This gives rise to situations such as ordering 1000 softballs when only 10 are required. NAVCOMPT's new model includes phased

obligation estimates and should produce more accurate predictions than previous models.

Increasing weapons system complexity is another factor which is difficult to pin down. Newer systems contracts generally consist of very high dollar values and a proportionately larger share of the NSF incurred obligations. In the past, SPCC's expenditure estimates were based on an average PLT and percentage split for both the provisioning (new systems) and replenishment. In actuality the numbers were very different. Provisioning was found to account for 45% of the obligations vice the 26% previously used and the lead times for the complex systems averaged 21 months vice the previous average of 13 to16 months. [Ref. 41: p. 3]

4. DLR Unique Factors

In addition to the above, certain factors affecting forecasts are unique to the DLR Budget Projects, BP81 and BP85. These factors make the forecasting problem more complicated and account, to some degree, for the uncertainty observed to date.

The lack of NSF historical data bases for DLRs is a fundamental problem for the forecaster. For AVDLRs, the suggestion has been made to use data from the 2R account, the Aviation Procurement Navy (APN) appropriation, to aid in the prediction process. This would provide a data base to expand from and should eliminate some of the uncertainty.

Another general factor which was mentioned before is the tendency to be overconservative in estimating expenditures to ensure solvency, the NSF managers' primary concern. BP85 has the potential of varying by $100's of millions which could drive the NSF into a negative cash

position. The conservative tendency must therefore be carefully considered when arriving at a forecast for DLR outlays. A final complicating factor is the split nature of these BPs. Each has a procurement and a repair side which must be accounted for and predicted.

Some specific factors include: 1) depot washout rate; 2) carcass loss rate; 3) workload standards; and 4) potential migration of rework of components into the organic sector.

Depot washout rate is the rate at which components are found to be unrepairable once they are inducted for maintenance. Carcass losses are losses incurred between shipment and receipt at the depot. These losses can be either physical losses or simply administrative errors in shipping documents. Using the past 3 years data, the Non-AVDLR carcass loss rate is approximately 3%. No rate has been established or is currently being used for AVDLRs [Ref. 46].

Workload standards (the number of man-hours required to fix a particular component) is another factor in determining a depot level repair facility's PLT for a particular item. As the migration of component rework to the organic sector develops, NSF financing of this effort will be affected and forecasts must be adjusted accordingly.

To summarize, many factors must be considered during the cash forecasting process. The uncertainty and difficulty in quantifying many of these factors contribute to the inherent forecasting problems. The need still exists to improve and "fine tune" the current forecasting systems. The next section will review several forecasting models in an effort to further identify the potential direction for future cash forecasting efforts.

5. Forecasting Models

Three forecasting models were reviewed. Two of the models are currently in use, one by NAVSUP and the other by NAVCOMPT. The third model was the result of a contracted study completed in 1976 by Control Analysis Corporation, entitled "Navy Stock Fund Financial Forecasting Model." Each model takes the same basic approach as discussed earlier. The end-of-period cash balance is computed from the beginning cash balance by adding any appropriated funding and collections, subtracting disbursements (expenditures), and adjusting for any transfers of cash to or from the fund. This ending balance is then split into the three programs of operations, inventory augmentation, and mobilization stock (Pre-positioned War Reserve). The primary differences in the two current models are the calculation and use of financial lead times and the obligations and expenditure patterns assumed.

a. NAVSUP Model

The cash forecasting model used by NSF managers at NAVSUP is a mechanization of a previous manual system. This system plotted actual and projected obligations and expenditures on a graph with dollars on the vertical axis and time on the horizontal axis as shown in Figure 4-1. These graphs were prepared for each Budget Project and were used as the primary tool in NAVSUP cash forecasting. Now that the model has been computerized, this collection and plotting exercise is more timely and possibly more accurate due to the mathematical derivation vice physical plotting of the obligation and expenditure lines. The errors associated with picking a point off a graph have been removed.

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Appendix B is a sample output from the NAVSUP model along with the
formulas used to generate the output. These can be referred to during the
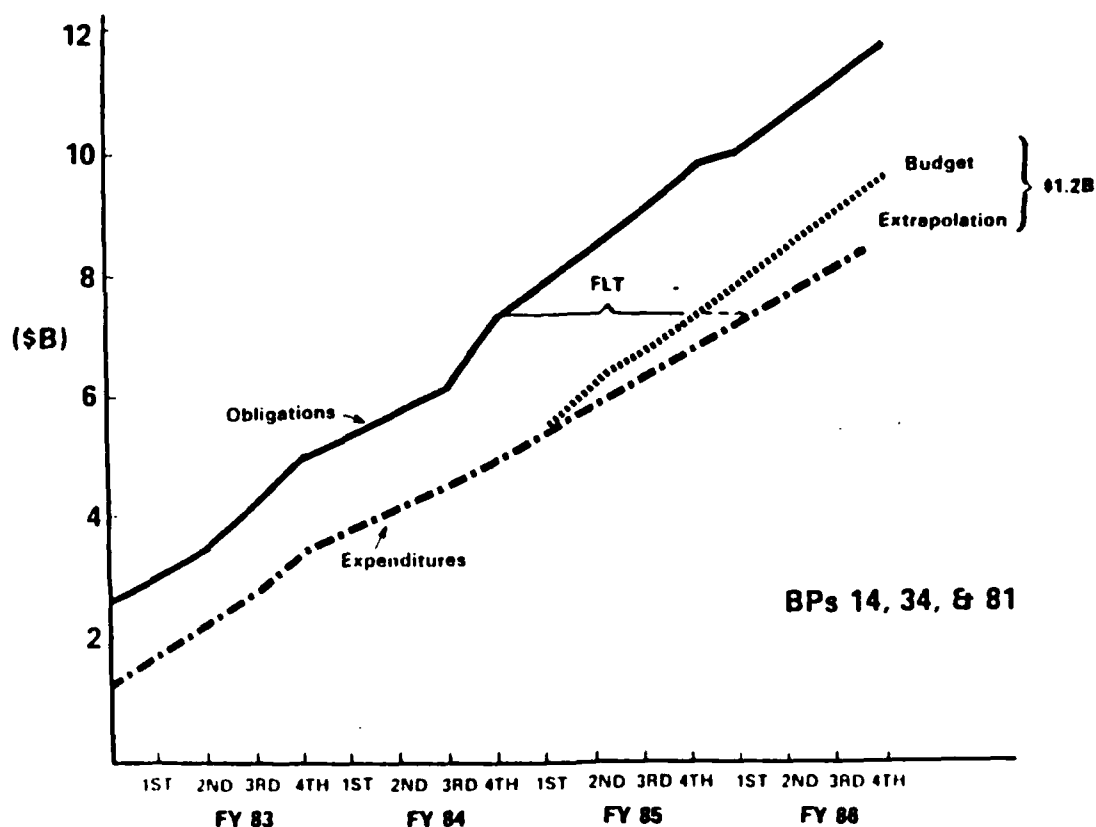
Figure 4-1   NAVSUP Expenditure Forecasting

Source: NAVSUP 60 Navy Stock Fund Presentation, April 1985

following discussion. Column headings will be listed in parentheses. The
"collection" side of the cash equation is taken directly from the ICP
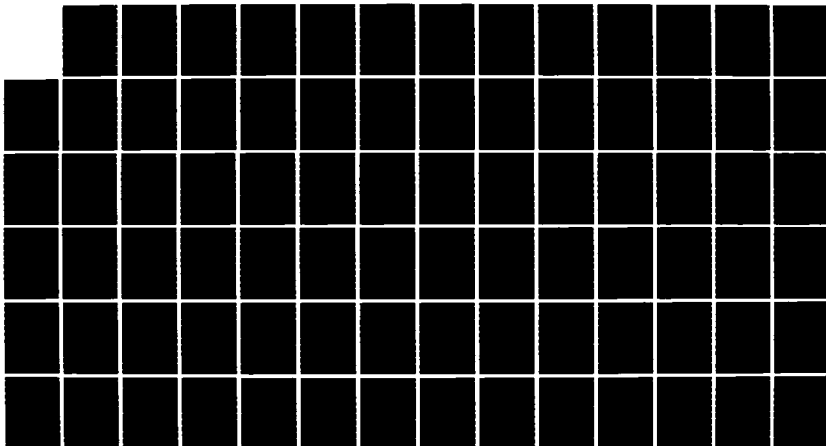
MICROCOPY CHART

estimates for each BP, summed to a total value. This value is then adjusted for BP25 (the NAVSUP managed clearance account used for fuel reclamation and special transactions such as litigations) and any changes to the total Accounts Receivable. The ICP inputs are reviewed for consistency with historical demand data, escalation changes, and any program changes in operational tempo, customer budgets, and outfitting schedules. These predictions are input directly into customer orders (ORDERS) and collections (SALES).

The "expenditure" side of the equation begins with the obligation program which is made up of existing outstanding obligations (Obligations Brought Forward (OBS BF)) and the projected future obligations (Obligations, Current Period (OBS CP)). These inputs are also derived for each BP from the ICP demand projections and are adjusted in the same manner as the collections. Projections for new program starts and changes in the NSF structure are taken into consideration as factors affecting the obligation program. The historical expenditure rate is then estimated and adjusted for predicted trends.

This estimated expenditure rate is the basis for the primary difference in the NAVSUP and NAVCOMPT models. NAVSUP assumes a smooth, nearly linear expenditure rate and extrapolates the expenditures based on that rate, adjusted for trends. FLT is then taken as the difference between the obligation and expenditure lines at any given dollar level as shown in Figure 4-1. FLT is therefore an output of this model rather than an input based on historical data. The NSF managers review the expenditure (EXPEND) and the FLT for reasonableness (comparing FLT with the average value for the last 12 months), however

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the end-of-period cash balance is based on the extrapolated expenditure
line. Once this expenditure level is established, the following formulas
are used to compute an FLT for each BP:

If the historical FLT has been > 12 months:

$$EXPEND = 12/FLT * (OBS\ BP)$$

(12/FLT represents the portion of existing outstanding obligations
which will be expended in the next 12 months.)
This can be re-written to solve for the FLT:

$$FLT = (12 * (OBS\ BF)) / EXPEND$$

If historical FLT is < 12 months the formula is more complicated:

$$EXPEND = (OBS\ BF) + (1 - (FLT/12)) * (OBS\ CP)$$

(This case assumes that all existing outstanding obligations will
become expenditures in one FLT and the expenditures generated during
the remainder of the 12 months will be (1-(FLT/12)) times the
projected obligations for the year.)
Solving for FLT yields :

$$FLT = 12 * (1 - ((EXPEND - OBS\ BF)/OBS\ CP))$$

The estimated expenditure is therefore derived without taking into
account any direct correlation to the pattern of obligations which give
rise to the expenditures.

The final steps calculate OUTLAYS as EXPEND less SALES and
apply the corrections for appropriations (APPROP) and transfers (XFERS)

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to yield obligations carried forward into the next year (OBS CF) and the end-of-period cash balance carried forward (CASH CF).

b. NAVCOMPT Model

NAVCOMPT's cash position forecasting model is closely integrated with their pricing mechanism and is a modified version of NAVSUP's model with an expanded historical data base . The same basic cash equation and approach are used in both. The difference in the two models centers on the prediction of the expenditures and the phasing of obligations. As stated above, NAVSUP uses a linear extrapolation of the historical expenditure line to predict the future level of expenditure. NAVCOMPT, on the other hand, generates the expenditure estimates based on the existing and predicted obligations and the actual historical FLTs.

Monthly obligation patterns and rates are assumed to remain constant from year to year (i.e., if in the past an average of 5% of the total was obligated in the first month then 5% is predicted for the first month this year). These patterns are calculated using a 3 year average for each Budget Project and separately for rework and procurement within the DLR BPs. This obligation pattern is reflected in the expenditure rates, offset by one FLT, and graphically results in a phased expenditure line paralleling the obligation line. This is in fact nearly the case in Figure 4-1 where the budgeted expenditure line would represent NAVCOMPT's estimate. While time and the vast numbers of obligations will most likely dampen the direct relation of the obligation rate to the expenditure rate, it is reasonable to assume that this pattern will be reflected to some degree. Given the magnitude of the funds involved, and

the necessary tight tolerances of any prediction model, the more accurate the pattern prediction, the better.

Appendix C is a sample of the NAVCOMPT model output for BP34 which may be referred to during the following discussion. The first step in determining the expenditure estimate is to compute the historical FLT. This is done by noting the current unliquidated obligations balance and working backwards in the cumulative obligations table until an equal amount has been accounted for as illustrated in Figure 4-2. The difference between that point in time and the current month is the FLT. This method assumes that any obligations prior to that date have been expended. The historical FLTs are listed in tabular form for each month.
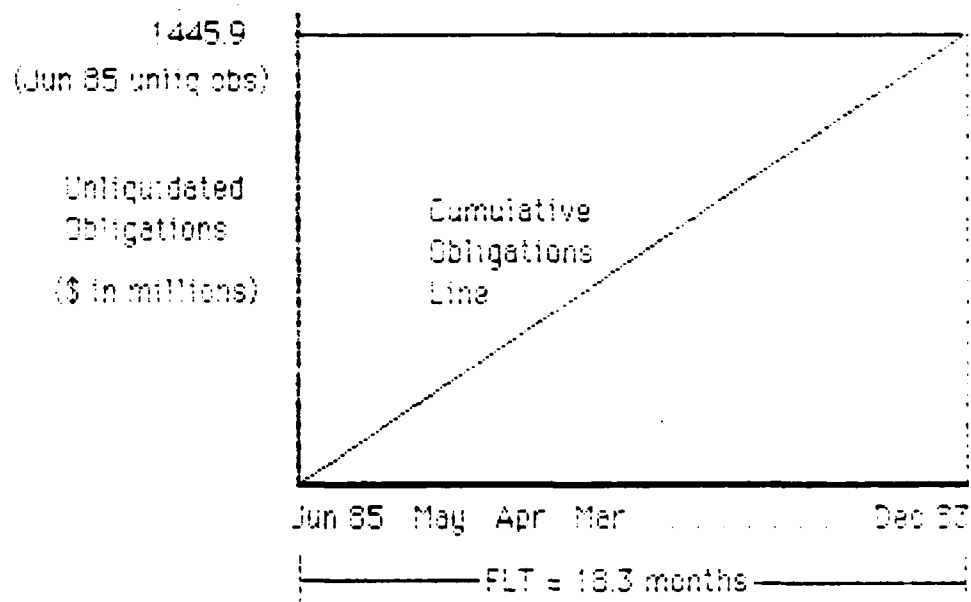

Figure 4-2 NAVCOMPT FLT Determination

The next step is to project future expenditures based on predicted FLTs. To accomplish this the obligations are projected using

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the historical phasing pattern and an FLT is predicted based on trends, program developments, and judgement. All the factors mentioned in the previous section should play a part in this FLT prediction. The projected expenditures are then generated by applying the predicted FLT to the projected obligations. Outlays and end-of-period cash can then be calculated.

NAVCOMPT's model has been active since June 1985 and was utilized for the first time for FY86 projections. Current estimates of excess cash for FY87 (cash in excess of the 11-day operating cash objective) are on the order of $930 million using NAVCOMPT's model and $560 million using NAVSUP's model. This significant difference is a function of the method used to project expenditures and the effect of different human judgemental inputs.

One common problem with both models is the lack of documentation. NAVCOMPT's model was generated by one individual using a standard Lotus™ spreadsheet and a personal computer. No documentation exists at present for this model. NAVSUP's model has been active for over two years and the only documentation which was available to the authors consisted of a printout of the formulas for the output.

c. 1976 NSF Financial Forecasting Model

This model incorporates the benefits of the other two models and provides additional historical and prediction data for NSF managers to predict and control NSF cash flows. The 1976 Control Analysis Corporation (CAC) study provides in-depth documentation on the complex financial and inventory relations within the NSF. Monthly predictions are constructed for each BP and are projected 12 months into the future. A

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moving 12 month data base is automatically maintained. Several files are preserved which allow easy data control and access. A History File holds the last five years' actual monthly values for a dozen different accounts at the BP and NSF level. The Prediction File stores up to 23 months of forecast values. The Parameter File holds the various statistics and budget plans for computations [Ref. 47: p. 9]. Additional features include the Forecast Error/Exception Report which compares current transaction outputs with the past 12 months of data. By reviewing this file, NSF managers would be able to quickly detect errors or significant changes in trends. The FLT Monitor Report is a "warning device that indicates when key statistics in the Parameter File require updating." [Ref. 47: p. 11]. Both production runs and experimental runs can be conducted, allowing sensitivity analysis of new project inputs or program changes.

Another major improvement is that the FLTs are presented as statistical distributions and the outputs are given as a range, a confidence interval of sorts, rather than single numbers. Inclusion of this confidence interval would give the NSF managers a feel for the accuracy of their forecasts.

All three of the above models follow the same basic format. NAVCOMPT's model is an improved version of NAVSUP's model. However, the additional aspects of error detection, statistically distributed data, and confidence interval outputs provided by the 1976 NSF Forecasting Model may make this a more preferred model.

G. PRICING AND BUDGETING

1. Pricing

Pricing has been identified as the primary control mechanism for NSF cash management. Pricing and budgeting for the NSF are interrelated in a complex process affected by customer budgets, the economy, individual item life cycles, and the 11-day required cash objective. This section will review the pricing and budgeting process to show the interelationships, the timing limitations, and the level of control on short-term cash within the NSF.

There are three primary objectives of the NSF pricing process:

1. Attain an eleven day cash balance,
2. Balance the NSF cash budgets with customer budgets,
3. Retain Total Obligational Authority (TOA) in the Navy during the budget decision process (maintaining "program").

These objectives are not only incompatible but are mutually exclusive at certain times in the budget process. NSF pricing is conducted annually and prices are kept stable for one year in accordance with the OSD Price/Rate Stabilization policy. This effectively protects the customer from price fluctuations which could impact the ability to purchase the entire budgeted "program". These prices, once set, can only be changed in rare instances, such as a new price definitization or a public relations adjustment (these exceptions will be discussed later), and are not available to balance cash in the short-term. Standard prices are computed using a historically based replacement cost adjusted by a series of surcharges which cover the cost of doing business and accomplish the balancing of customer budgets and the NSF budgets.

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The process begins at the ICP level where each Navy Stock Number (NSN) item is reviewed and a base price is established. For both consumable and repairable items which have been recently procured (within the last 12 months), the most recent purchase price is used as the base price. For those items which have not been recently procured, the last purchase price is adjusted for inflation which has occurred since it's procurement by applying an OSD established inflation factor to achieve the new base price. This process takes place each year and provides the "platform" for the computation of standard prices.

The next step is to apply surcharges to the base price. There are three surcharges which apply: 1) Navy; 2) Inventory Management; and 3) Price Stabilization. A summary of surcharges used for FY86 are included in Table 11. The Navy surcharge covers the cost of doing business and is comprised of inventory losses, transportation, and obsolescence.

Inventory losses are based on historical rates for pilfered, mishandled, and damaged inventory derived from the Financial Inventory Report (FIR).

The NSF pays for transportation costs which are incurred upon initial shipment of newly procured inventory to Navy stock points and any subsequent redistribution of inventory. This data is compiled from information included in the Consolidated Expenditure Reporting System (CERPS).

Obsolescence refers to the material that is no longer useable due to expiration of shelf-life, technological advances, or phase-outs of support requirements. The obsolescence charge is calculated from data taken from the FIR. Note that the obsolescence charge for DLRs is

significantly less than that for consumables due to the repeated use and repair of the former.

The above Navy surcharge elements are all based on historical data and are expressed as a percentage of the replacement price. These

TABLE 11

SURCHARGES APPLIED IN FY86 NSF PRICES

	SPCC		ASO	
	Consumables	DLRs	Consumables	DLRs
Navy Surcharge:				
Transportation	2.1%	1.5%	1.3%	1.0%
Losses	2.3%	1.5%	2.7%	1.0%
Obsolescence	8.6%	3.0%	8.0%	2.0%
Total Navy Surcharge	13.0%	6.0%	12.0%	4.0%
Inventory Maintenance Surcharge	10.5%	7.9%	6.2%	2.9%
Price Stabilization Surcharge	-1.3%	-1.9%	13.1%	1.1%
Total Surchage	22.2%	12.0%	31.3%	8.0%

Source: "Navy Stock Fund Pricing: Math or Mirrors?"

elements are then added to the prices of Navy managed material in order to recoup the costs incurred.

The Inventory Maintenance surcharge is applied to provide a source of revenue which allows the NSF to finance the ongoing cost, or "churn", of Navy managed items which results from changes in demand. This charge also recoups the transportation, inventory loss, and obsolescence costs of non-Navy managed material. Material managed by other stock funds must be bought and sold by the NSF at standard prices developed by the respective stock fund managers. The Navy's costs incurred in handling this material is not considered in the other stock funds' standard prices. The Inventory Maintenance surcharge provides for the recoupment of these costs from the sale of Navy managed items.

The Price Stabilization surcharge is employed to balance the customer budgets to the stock fund budgets. The new replacement prices, adjusted for Navy and Inventory Maintenance surcharges are used by the ICPs to establish an overall demand dollar value for the year. This value is compared to the previous year's value and a Price Stabilization surcharge is calculated and applied to the new standard prices to achieve the overall Fiscal Year to Fiscal Year price change built into the customer budgets. When used to adjust to the 11-day cash balance, this new value is compared to the value necessary to reach the new balance and the surcharge is set accordingly.

Note that the Price Stabilization surcharge in FY86 was negative, indicating an actual reduction in customer prices. The end result is a standard price for each NSN which recovers the cost of doing business and balances to the desired cash balance or the customer budget. This process additionally maintains TOA within the Navy. These surcharges are computed annually for each BP.

For all consumable items there is only one price, the standard price as calculated above. DLRs will have either a standard price or a net price, depending on whether or not the customer turns in a carcass for exchange. Figure 4-3 illustrates the development of a standard price for

* Establish Replacement Price $100.00 (Assume FY84 Buy)

    - Escalate to Current Year Base   X 1.04 (to FY85 Base)

    - FY85 Replacement Price $104.00

* Apply Navy, Inventory Maintenance
  and Price Stabilization Surcharge   X 1.12

    - Navy Surcharge (6%)
      Covers the cost of doing business:
      Transportation, Losses,
      and Obselescence

    - Inventory Maintenance Surcharge (7.9%)
      Covers "churn" in maintaining
      approved inventory levels

    - Price Stabilization Surcharge (-1.9%)
      Balances annual NSF prices to customer
      budgets

    - Computed Price $116.48

* Rounded to Standard Price of $117.00

Figure 4-3   FY86 Non-AVDLR Price Computation (Standard)
      Source: "Navy Stock Fund Pricing: Math or Mirrors?"

a FY86 non-AVDLR which had a last procured price of $100 in FY84. The $100 is indexed by the inflation factor to yield the replacement price for

FY85. The Navy, Inventory Maintenance, and Price Stabilization surcharges are then applied to yield the FY86 standard price of $117.

Figure 4-4 illustrates the similar but slightly more complicated computation of net price for a DLR. The fundamental difference lies in the concept that even though the established repair price is less than the established replacement price, the dollar amount which must be recouped from the Navy surcharge for the cost of doing business is the same. As shown in Figure 4-4, in order to recoup the same $6 (6% of the $100 replacement price in the standard price scenario), a Navy surcharge of 19.3% is needed with the repair price of $31.10 (.193 X $31.10 = $6). The Inventory Maintenance surcharge need not be adjusted for the base because it was generated as a percentage of the aggregate of all BP transactions at the NSF level.

Two other surcharges enter into the computation of a net price: 1) Carcass Loss Factor, an adjustment for those carcasses that are either never shipped, lost, or damaged in shipment; and 2) Depot Washout Rate, which provides revenue to replace those carcasses that are returned but are found to be Beyond Economic Repair (BER). These BER carcasses must be surveyed and replaced with new procurements. The carcass loss rate is based on historical rates and is currently 3% for Non-AVDLRs. No carcass loss rate has been established for AVDLRs due to the lack of historical data in this program. Therefore, the carcass loss rate is not included in the AVDLR net price computation at this time. The Depot Washout Rate is applied to both Aviation and Non- Aviation DLRs.

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NSF prices therefore are "representative" of the item cost to the Stock Fund and at the same time serve to provide inventory stability and a balance with the customer budgets.

* Establish Repair Price $31.10

*Apply Net Price Factor   <u>X 1.40</u>

- Depot Washout Factor (15.5%)
  Covers cost of material not
  surviving depot repair

- Carcass Loss Factor (3%)
  Covers cost of retrograde losses

- Navy Surcharge (19.3% of Repair
  Price which is equivalent to 6%
  of Replacement Price)

- Inventory Maintenance Surcharge (7.9%)

- Price Stabilization Surcharge (-5.7%)
  Balances annual NSF prices to customer
  budget

- Computed Net Price $43.54

* Rounded to a Net Price of   <u>$44.00</u>

Figure 4-4   FY86 Non-AVDLR Price Computation (Net)
        Source: "Navy Stock Fund Pricing: Math or Mirrors?"

2. Budgeting Cycles

The NSF budget process begins with an estimate of the annual demand based requirements. These requirements are balanced against

on-hand and on-order assets through the stratification process to yield the amount of obligational authority which will be requested to meet the demand. Each budget is actually a "zero-based budget" generated from specific annual requirements. NSF budgets are constructed initially by the BP managers, collected and consolidated by the NSF managers at NAVSUP, and then reviewed by NAVCOMPT and CNO. They are subsequently submitted to OSD/OMB for approval.

The NSF managers develop budget inputs twice each year, once for the input to the President's Budget and once for the Apportionment review. Since each input includes estimates for three fiscal years, each year is budgeted and re-budgeted seven separate times as shown in Figure 4-5 [Ref. 13: p. 30].

FY85 appears as one of the three fiscal years in three "Blue Books", three "Brown Books" and the mid-year review in February of the FY85 execution year. "Blue Book" refers to the Navy's input to the President's budget and "Brown Book" refers to the initial apportionment input to OSD.

3. Pricing Motivations

Timing defines the nature of a price adjustment. Since initial budget estimates are made over two years prior to the execution year, there is a great deal of uncertainty involved. The purpose of the pricing computations differs as the budget year approaches. The following is an excerpt from a NAVSUP presentation which addresses the history and some of the political aspects of the pricing timetable:

Between June and September 84 we computed FY85 prices which took effect in October 84. The FY85 budget was before Congress

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while the FY86 budget was working in Navy. NSF prices were coming down due to BOSS and other economic impacts. The prices in the FY85 budget on the Hill were set to match the NSF prices with the customer accounts. . . . when we execute the FY85 budget, we will pull the customer funds into the stock fund and produce excess cash. Based on a projection of excess cash at the end of FY86, we set the FY86 prices to attain the legally required 11 day operating stock fund cash balance. [Ref. 48]

	Timeframe	Event	FY's Covered
FY85 Obligational Authority Requests	Summer 1983 Blue Book	FY85 President's Budget's Estimate	83 - 84 - 85
	Spring 1984 Brown Book	FY85 Apportionment Request	83 - 84 - 85
	Summer 1984 Blue Book	FY86 President's Budget Estimate	84 - 85 - 86
	February 1985	FY85 Midyear Review	85
	Spring 1985 Brown Book	FY86 Apportionment Request	84 - 85 - 86
FY85 Obligational Status Estimate	Summer 1985 Blue Book	FY87 President's Budget Estimate	85 - 86 - 87
	Spring 1985 Brown Book	FY87 Apportionment Request	85 - 86 - 87

Figure 4-5 NSF Budget Cycle

In the initial budget estimate (ie. summer '83 for FY85) the pricing motivation is to achieve the 11-day cash balance. The Pricing Stabilization surcharge is set to match the calculated 11-day value of

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operations cash disbursements. These prices are then applied to the forecasted customer demand to calculate the customer budgets for the budget year, FY85 in this example. The next pricing adjustment will take place the following year, in the summer of '84, when, as stated in the excerpt above, the FY85 budget is in Congress. Prices for FY85 are now balanced to the actual customer budgets to ensure that all budgeted programs will be funded and that Navy TOA will be protected. In recent history, this has resulted in an excess of cash.

The process begins at the same time for FY86. The 11-day cash balance is the objective for the FY86 pricing calculations in the summer of '84. The price changes are made over a year before the beginning of the execution year. Figure 4-6 illustrates some of the variations which took place within the FY85 cash structure during the budget process [Ref 48]. As can be seen, significant dollar amounts, coupled with a wide range of causes, indicates that pricing cannot be considered an effective control mechanism in the present political and budgeting systems.

Pricing is changed once a year as noted above. There are other times when prices are changed which can affect the short term cash position to a small degree. Two examples are: 1) the "re-definitization" of a price for a particular item; and 2) "public relations" price changes. Re-definitization occurs when a procurement buy is made at a significantly different price than initial estimates or previous prices. If considered major enough, a BP manager may initiate a price change to the master data file, which takes 120--150 days to execute.

The other example of potential short term cash control is the public relations pricing change. This occurs when public attention and

FY 85 Cash Projection History

DATE	REVIEW	EOP CASH PROJECTION	REMARKS
SEP 83	FY 85 OSD Input	1168M	Initial Estimate
JAN 84	FY 85 Pres Budget	896M	-155M Congressional Mark (NSF Approp.) -100M Transfer Request Denied
JUN 84	FY 85 Apportionment	964M	+70M Change to Competition Goals
AUG 84	FY 86 Navy Budget Review FY 85 Reapportionment	1536M	+200M SPCC OBS Adjustment +100M Sales Projection Increase +265M Non-AVDLR FLT Stretchout
JAN 85	FY 86 Pres Budget	1325M	-150M Cash Mark (Customer Mark) -45M Fuel Rebate -75M Norfolk Levels +70M Sales from FY 84
APR 85	Special	1905M	+340M AVDLR Outlay Rate Change +200M BOSS/Timing Impact on FLT

Figure 4-6   FY85 Cash History

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opinion are directed at a specific item price which is determined to be "in error." BP managers, at their discretion, may adjust prices in these instances with specific threshold limitations of ± $1 million/BP for consumables and ±$2 million/BP for repairables. Even if all 10 BP managers employed this option the total impact on the NSF would be only $12 million. When compared to cash excesses approaching $1 billion, public relations price changes are insignificant.

The dollar impact of these price changes on total NSF cash is minimal and therefore pricing cannot be considered a significant control mechanism. Pricing is not a short term cash management tool.

4. Additional Pricing Problems

Aside from the major problem of not being an effective cash management tool, pricing suffers from several other problems. Three specific problems are: 1) currency of the base cost; 2) DLR repair prices being higher than replacement prices; and 3) duration of acquisition lead times.

a. Base Cost Currency

The currency of the base cost is critical in that, as explained before, the entire price structure of a particular item is calculated on this base. This problem doesn't exist for the high turnover, short lead time material for which current procurement buy prices are available. These items are considered "self-correcting" due to their short time horizons. But for some of the large, slow moving items, like a ship's bull mesh gears, which may have been procured 15-20 years ago, the problem can be serious. The problem centers on the fact that the inflation factors used to adjust the last purchase price to a "current" base cost

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(replacement cost) may yield a price which in no way resembles the actual replacement cost of the item. Actual replacement cost would be preferred, however, some items are no longer in production. These items would be prohibitively expensive if a firm had to tool up and begin production of the items. This expense would be even larger if there were only a small number of items ordered. This base cost must be validated for replacement price in order to more accurately estimate the standard and net pricing and to accurately show the inventory value of the NSF.

b. Repair/Replacement Relative Pricing

AVDLR pricing is complicated by having both standard and net prices. This complication occassionally results in the situation where it costs more for a component to be repaired than it does to buy a new one. This is obviously an unacceptable condition, unrealistically driven by aggregate surcharges. In an effort to minimize these occurrences, an AVDLR screen has been established at ASO which identifies these situations and allows review and adjustments where necessary.

c. Duration of Acquisition Lead Times

Duration of the acquisition lead times falls back into the realm of forecasting, which effectively drives the pricing process. This time period spans the entire acquisition process from initial requirement specification to the final delivery of the item. The necessity of being able to accurately predict these times is fundamental to the forecasting, and therefore the pricing and budgeting process. Some attention is being placed on improving models which predict financial lead time (FLT) and production lead time (PLT), elements of the acquisition lead time. "Q-Star" is a program currently being tested at SPCC which will aid in

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predicting PLT and further aid contracting agents to better select between price/volume options offered by contractors. Several improvements to existing forecasting models are possible which will make the FLT estimates more accurate.

5. Summary

The pricing and budgeting processes are heavily dependent on each other. Pricing follows OSD directives and initially strives to achieve the legally required 11-day operating cash balance. Surcharges allow the NSF to recover its costs and therefore exist as a revolving fund. This has resulted in improved readiness. Availability rates for Non-AVDLRs have improved by over 30% since their inclusion in the NSF [Ref. 23: p. 1-5].

For the Reapportionment budget just prior to the execution year, the pricing is aimed at balancing NSF cash to the customer budget vice the 11-day requirement. This shift in focus from the 11-day objective to the customer budget is fundamental to the problem of NSF cash management. While logically justified, in order to maintain TOA and programs, this shift relegates cash management to a secondary priority. In summary, the goal of minimizing cash held outside the Treasury is hindered by the present budgeting and pricing systems.

V. POTENTIAL CASH MANAGEMENT IMPROVEMENTS

Chapter IV presented the various methods of controlling and managing cash within the Navy Stock Fund. It addressed the control mechanisms available and discussed the major areas of cash control. Four of the primary financial operations common within any agency handling cash are billings, collections, disbursements, and deposits. These areas are operating efficiently within the NSF and require only minor improvements by NSF managers to increase effectiveness.

A prime consideration for the above statement is that a very small portion of NSF operations deals with the traditional "cash" sales found in private retail companies. The vast majority of the NSF transactions are merely book keeping entries, made within the Treasury Department via a transfer of obligational authority between accounts. For instance, only 5% of FY85 sales at NSC Puget Sound, Wa., are actual "cash" sales. These cash sales are made to other Federal agencies, (i.e., the Coast Guard) and civilian customers such as Pan Am and Westinghouse, who hold government contracts for service and support of the submarine base at Bangor, Wa., and the Nuclear Training Facility at Idaho Falls, id., respectively [Ref. 25].

Billings and disbursements were found to adhere to the legislative guidelines of the Prompt Payment Act and the Deficit Reduction Act. Interest penalties for late payments, though still large relative to other

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services, have dropped significantly since FY83 and mechanisms are in place to continue this improving trend.

Collections are also on track with only a few exceptions. Again, at NSC Puget Sound, collections due from the Coast Guard (approximately $300,000) are running on the order of 8 months late. This is understandable, due to the current tight financial position of the Coast Guard, and is not reflective of the NSF managers' ability to collect. Inter fund and intra fund transfer systems are in place to handle the internal collections automatically, theoretically providing "instant" cash. Problems with this "instant" cash, such as unprocessed billings which have been as high as $1-2 million at NSC Puget Sound alone and up to $1 billion for total NSF, are related primarily to current ADP limitations and human error. [Ref. 25]

Deposits pose little problem since cash collections are turned over on the day of receipt to the Disbursing Officer, who deposits the funds to a Treasury bank within 2-3 working days. These primary financial transactions were not identified as areas for major NSF cash management improvement during the course of this research.

Six additional areas which have potential for improved cash management within the NSF are:

A. Flexible Standard Pricing
B. Forecasting
C. Accounting
D. Automatic Data Processing
E. Incentives
F. Human Factors

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Each of these areas will be discussed with attention to potential cash management improvements.

A. FLEXIBLE STANDARD PRICING

The use of flexible standard pricing would allow the Stock Fund managers to adjust their item prices during the execution year in order to control NSF cash. There are, however, serious implications which must be considered before implementing flexible standard prices.

Mid-year price changes were mentioned in Chapter IV as a potential cash control mechanism. If instituted, this practice would effectively give the NSF manager more positive control of cash position and flow. If such a control had been available during FY84, the $550 million end-of-period cash excess could possibly have been reduced. This control could work both ways, however, and care would have to be taken to avoid overcorrecting prices and driving the NSF into a negative cash position. It is better to err on the side of excess cash.

In 1975, the current pricing computation system was initiated with the introduction of the Price Stabilization Surcharge (concurrent with Rate Stabilization for the Navy Industrial Fund). This response to the high inflation rates encountered during 1975-1980 was an attempt to allow customer appropriations to be executed in an environment of relative financial stability. Prices were set just prior to the execution year and held constant throughout the year. In 1981, the pricing process was started sooner so that one additional year was available to allow customer account alignment with the NSF prices in the Navy's submission to the President's budget.

As discussed in Chapter IV, current pricing practice sets prices more than 2 years prior to the execution year and balances, at that time, to the projected 11-day operating cash objective. Customer budget submissions are then calculated based on these prices. The following year, prices are set to ensure that the approved customer appropriations can buy all the Stock Fund material which had been initially programmed. The end result is that prices are set to balance to the customer budget. NSF cash is being forced to absorb the variation between the budgeted/forecasted levels and the actual activity outcome.

While the present system is by no means perfect, it does provide stability for the customer. Two problem areas exist which impact on current practice: 1) currency of the base cost; and 2) validity of the Price Stabilization Surcharge. These problems were discussed earlier and are worthy of continued study. The more fundamental question of whether or not to use flexible standard prices remains unanswered.

While flexible standard prices would make control of current period cash easier, it would have a negative impact on the stability of the present budgeting system. Mid-year price changes could result in a loss of budgeted "program" if the customer could not afford to pay for his approved requirements due to higher prices. Additionally, the Navy could lose budget credibility in Congress for not being able to execute their budgeted programs.

A decision must be made on the relative priorities of cash management and stability within the budget process. With the current system, stability allows for a smooth budgeting process. The price for this

stability is limited control on NSF cash. All factors considered, the stability of the present system outweighs the benefits of flexible standard pricing.

Given that flexible standard pricing is not a strong option, the greatest potential for cash management control shifts to forecasting, the subject of the next section.

B. FORECASTING

Pricing has been identified as the primary cash management tool for the NSF. For the reasons mentioned above, the real control is a function of the accuracy of the forecasted estimates used to derive the prices. This concept is not new as evidenced by a quote from the Cash Management Workshop held in Washington D.C. on October 18, 1978:

Agencies can play an important role in the achievement of
efficient government wide cash managment procedures by
providing accurate cash flow forecasts to Treasury.
[Ref. 6: p. 11]

Improvements in the accuracy of the existing NSF cash forecasting models and the consolidation of the various models into one would provide several key advantages. First, an improved model would aid NSF managers in achieving the established end-of-period target of 11-days operating cash. Excesses over this target, such as those which occurred in FY84 and FY85, could possibly be reduced or eliminated. Secondly, with better accuracy, NSF managers may be able to reduce the operating cash objective to a level below the current 11-day requirement (being careful

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not to allow the cash balance to go negative), thereby reducing the amount of NSF cash required to be held outside the Treasury.

Improvements to the forecasting model should include several of the factors discussed in Chapter IV. An in-depth, accurate, accessible history file of all pertinent accounts should be maintained. This would allow application of modern statistical techniques such as regression and time series which may provide better forecasts. Obligation patterns should reflect seasonal trends such as the increased obligation rate during the 4th quarter. The model should have the capability of running sensitivity tests to proposed changes in program requirements or NSF structures. Critical factors such as financial lead time (FLT) should be historically derived and calculated using accurate statistical distributions. Routines should be included to act as "flags" for error detection due to human error inputs or excessive variance from previous entries. If a particular entry has changed significantly, the NSF manager could validate the entry and proceed with the forecast. Finally, the output should include some form of confidence interval to allow the NSF manager to judge the validity of the estimate.

The model should be made available to all levels of the NSF organization. This would afford each activity the opportunity to monitor and participate in the cash forecasts. The authors believe that the incentive for better NSF cash management would be increased and improved forecast accuracy realized by utilization of the "bottom up" method with input from the lower levels.

The 1976 Control Analysis Corporation study presented a model, as described in Chapter IV, which includes many of these desired characteristics. An upgrade of this model should be developed to take advantage of current technology and the availability of microcomputers. The authors feel that the potential improvements outlined in this study should be investigated and if possible incorporated into a new cash forecasting model for the NSF. Further study may allow this model to be used Navy-wide to help managers forecast and control their cash flows.

There are several specific forecasting related initiatives which can be pursued which will aid in improving the current forecasting procedures. These include: 1) obligation validation; 2) contracting PLTs; and 3) tracking specific obligations to their expenditures to determine actual FLTs. Though each of these areas are related in the forecasting process, each will be discussed separately.

1. Obligation Validation

Each NSF forecasting model currently in use computes expenditures by applying FLT to the actual and/or predicted unliquidated obligations. An accurate obligation value is critical. Obligation validation (Obs Val) is a process by which overdue obligations are reviewed to ensure the obligations still represent valid requirements. "Invalid obligations occur when material has been requisitioned by the Stock Point which has not and will not be received, billed or paid for." [Ref. 14: p. 33] Obs Val is done monthly at the ICPs and three times per year at the NSCs. Tables 9 and 10 illustrate SPCC's ongoing effort to identify and revise the value of unliquidated obligations. As depicted, a significant amount of NSF obligational authority is tied up in invalid obligations. At NSC Puget

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Sound, between August and December of 1985, 45% of the total overdue obligations were determined to be invalid representing 30% of the dollar value of these overdue obligations [Ref. 25]. At SPCC, a six person team works full time on the Obs Val problem. Their efforts have identified invalid obligation dollar values at the rate of 10% of the overdue obligations. In FY84, the funds released for additional requirements at SPCC alone were more than $63 million. On average, this amount equates to 3% of the total unliquidated obligations. [Ref. 42]

   2. Contracting for PLT

      Production lead time (PLT) is the time from initial contract award to the delivery of the first item. This is the primary component of financial lead time (FLT). By including PLT in the contract, the contracting agent can effectively define the major portion of FLT. The remaining lead time, from receipt of the material to payment of the bill, is primarily controlled by the Navy and the billing system. This practice would enable the FLT, the most significant variable in deriving expenditures from obligations, to be reduced to a more predictable value. Care must be taken not to move too fast in the effort to contract for PLTs. If PLTs are reduced too quickly, the resulting early expenditures could conceivably drive the NSF into a negative cash position.

      Contracting for procurement of NSF material occurs at the ICP and the NSC levels. The ICPs provide guidance to the NSCs which details items which are authorized for local procurement. By contracting for PLT, cash managment control can be extended down to the NSC, increasing cash awareness and improving overall cash management.

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3. Tracking Obligations to Expenditures

The prediction of FLT continues to be a difficult task which has become essentially a matter of individual judgement on the part of the NSF manager. FLT is the time between the obligation and the expenditure. In order to eliminate much of the guesswork from the FLT estimates, a system of tracking a specific obligation through to its expenditure should be designed and installed. By collecting actual FLTs for each obligation, a real-world historical distribution data base could be gathered. This data base could then be analyzed to identify certain items as outliers and adjustments to predictions could be made accordingly. This would allow for better estimates of a mean FLT for use in forecasting and would provide a standard deviation for use in establishing the confidence interval.

This sounds simple on the surface but there are several problems which must first be addressed.

The mechanics of this tracking system will require careful planning and implementation. A preferred method would be to assign a number to the obligation, including the julian date, which would follow through to the expenditure. The expenditure date could then be compared to the date in the obligation number and the FLT could be automatically derived. No such number currently follows through the entire process from obligation to expenditure for all Navy procurements. This problem is compounded by the use of two totally separate numbers for the accounting and the supply systems. The line of accounting data uses job order number and the supply system uses a requisition number.

There are numerous candidates for such a number including the purchase order number and the contract number. Unfortunately, neither of these contains the julian date which makes them unsuitable for the proposed system. A more likely candidate would be the requisition number, a 14 character string which does include the julian date and is initiated by the activity requesting the procurement. A sample requisition number is coded as follows:

UIC FY Date Serial No.
N00244 - 6 - 323 - 1234

One concern with the proposed system was the difficulty and potential confusion in selecting the actual date of obligation. Aside from the inclusion of the julian date, this number would be a good tracking number due to its coincidence with the initiation of the obligation. The requisition number is established as the first document for the procurement action. The concern expressed by some managers over requisition numbers which are cut prior to the availability of funds, a delay in some cases of up to six months, is actually a benefit for the system. While the date in this number will not coincide with the accounting system entry of an obligation, it does more realistically reflect the actual date that the funds were encumbered for the obligation. The time delay between initial requisitioning and actual signing of a contract is procurement lead time and should be reflected in the total FLT.

The requisition number is included on the purchase order, and is also included on the contract report. Since it includes the date and corresponds to the encumbrance of funds, the requisition number is recommended for use in the proposed tracking system.

Certain policies and systems would need to be developed to allow the tracking of specific obligations to expenditures. Due to the critical nature of FLTs in the forecasting process, computation of statistically distributed FLTs derived from actual data should be worth the effort. Currently the development of resystemization, a software upgrade at the ICP level, is ongoing in the Navy. The timing appears excellent for inclusion of the above tracking system in the resystemization program. The addition of this tracking system would provide useful information for NSF managers as well as others within the Navy financial management community.

C. ACCOUNTING PROCEDURES

Cash management requires concise, accurate, and timely information for the NSF managers' use. The Navy currently uses many accounting systems, each separate and different. These range from obligational accounting to accrual and cost accounting. It is no surprise that there is some difficulty in translating information from one system to another and problem areas exist within the Navy as a result of this variety of systems. Insufficient data generated by NSF's accounting systems complicates managers' tasks in controlling and monitoring cash. When a problem has been identified, the accounting system "doesn't offer much of a means to figure out what did happen." [Ref. 17] Continuing problems

exist such as discrepancies between the inventory account and the financial account at the stock point. This reconciliation is accomplished by matching the Master Stock Inventory Record (MSIR) with the Financial Inventory Control Ledger (FICL). Two GS-9 employees at NSC San Diego monitor this reconciliation full time and still some inaccuracies arise. Further, certain procedures exist which contribute to the difficulty of managing NSF cash. Two of the most notable are: 1) the use of Register 24 collection estimates; and 2) Centrally Managed Allotments for the SAC 207 Ships.

1. Register 24 Collection Estimates

Register 24 is an estimating technique which has resulted in sizeable misstatements of end-of-period NSF cash. Originally established as a tool to counter late or missing reports of collections to the Fleet Accounting and Disbursement Centers (FAADCs), these entries attempt to smooth out the overall collections reported by the FAADC, compensating for underestatements due to delinquent reports. When an issuing activity (stock point or ICP) fails to complete the NAVCOMPT form 2074 on time, a register 24 entry is made at NAFC in order to estimate the collections and to effect interfund transfers. This estimate is "backed out" when the actual report form comes in, normally the next month, and the actual numbers are entered. Problems exist in three areas: 1) the estimate values; 2) the tape handling mechanics; and 3) the lack of an ingrained validity check.

Within the area of estimates, two problems surface. First the estimates are not seasonally phased values but are averages of the last 12 months of collections for each particular activity. Based on preliminary

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investigations, out of some 40 activities making estimates in FY85, estimated collections were running between 30% and 36% above actual collections. [Ref. 17]   Second, the estimates are pre-programmed and entered into the system once at the beginning of the year. They are not adjustable as more current information, such as changes in support patterns (e.g., peace keeping actions in the Middle East), becomes available. In short, the validity of these estimates is in question and no changes are allowed during the execution year. The need for flexibility requires that the system should be responsive to these changes and allow for the mid-year adjustment of collection estimates.

The second problem area deals with the mechanics of the system and the lack of controls to prevent human errors. The estimates are loaded into the system via magnetic tapes. When the actual value tapes arrive, they are loaded into the system.   The old tape must then be loaded once more in order to "back out" the previous estimate. Multiple handling of tapes and human inputs and changes have resulted in errors when the actuals were entered and the estimates were inadvertently not removed. This is speculated to have occurred in September and October of 1985, resulting in an overstated collections account of approximately $50 million. The system should have programmed checks to catch duplicate entry of actuals and estimates tapes.

An example of a different problem, which may have occurred in the past, highlights the lack of control data available in the present accounting systems. One aircraft carrier submitted an October estimate on the order of $25 million, much larger than any single month estimate should be for one ship. At the same, time no other major estimates were

made for October so that the total estimate for all activities did not appear out of line with the normal levels. In reality, the total collections were much lower than estimated due to the error by the one carrier. The system did not identify the gross overestimation as an error to NSF managers which denied them the chance to stop the entry. An overstatement such as this will invalidate the cash requirement calculations by a like amount. [Ref. 17]

Instances of ships being as much as 9 months late in reporting actual figures have further compounded this problem. Reasons for the late reports include deployment cycles, ADP parity errors, and simple mis-routing of the hard copy paper. The obvious solution to the above problem is to eliminate late reports and thus the need for estimates. In lieu of that, forecasts of estimates must be improved and the Register 24 system should allow mid-year updates to the estimates.

2. Centrally Managed Allotment (CMA) / Budget Estimation for Special Accounting Class (SAC) 207 Ships

The use of CMA accounting has been identified as a potential problem by GAO. It has been called "too loose" primarily due to the lack of control over obligations by the central accounting agency. It amounts to a catch-up form of accounting, recording what has happened without inducing the need to control "spending" as it occurs. This trailing posture is illustrated by the routine underestimation of BP28 obligations for SAC 207 ships predicted each year. Advantages and disadvantages exist for using CMA which will be discussed below.

The Navy Comptroller's Manual defines a Centrally Managed Allotment (CMA) as:

> . . . an allotment made by the head of an office or command in a specific amount published for charge for specific purposes by designated officials without specific limitation as to any individual official. A centrally managed allotment is issued when a regular allotment is impractical. [Ref. 16: p. a-3]

ICP Budget Project managers use the CMA as one method of executing the resources suballocated to them by NAVSUP, as was described in Chapter III. SPCC and ASO use this method to a lesser degree than NAVRESSO and FMSO, who are heavily involved in this type of execution.

Those customers authorized to charge against a Budget Project CMA effectively have authority to spend or obligate funds with no specific dollar target. These units include small shore activities not holding specific allotments and afloat units carrying NSF financed inventories known as Special Accounting Class (SAC) 207 Ships. The Budget Project Manager acts as the AAA for these allotments and establishes NSF simultaneous obligations and expenditures when notified that disbursements of NSF resources have been charged against them. The manager knows nothing about the obligation until he gets the bill.

The primary advantages of this system are: 1) enhanced fleet readiness, since the SAC 207 ships have essentially a blank check for purchases; and 2) a minimized accounting workload which decreases the manpower needed to perform the required accounting functions. Critics

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have described the process as being one which doesn't provide positive control. The main criticism has been aimed at the SAC 207 ship accounting process. This area is receiving a great deal of attention at all levels of the NSF organization. [Ref. 30]

To review, the Navy maintains NSF inventories aboard afloat stock outlets comprised of Mobile Logistic Support Force ships, aircraft carriers, and tenders. These ships carry specific material designated in Coordinated Shipboard Allowance Lists (COSALS) to support themselves as well as material designated to support their special mission. An example would be the items found in an Aviation Consolidated Allowance List (AVCAL) which are carried aboard an aircraft carrier. These various load and allowance list inventories are financed by the NSF and are carried in FIR Special Accounting Class (SAC) 207.

Resupply of SAC 207 units is usually provided by ashore Navy stock points. Retail material which is not available in the NSF at the supporting stock point is procured from DLA and other stock funds as a charge to a FMSO CMA for BP28 (Retail Supplies).

How much material is going to be charged to the BP28 account by SAC 207 units? This question is reiterated here to emphasize that this is an unknown until the Budget Project manager receives the bills. This amount has been known to fluctuate between $1 million and $50 million per day. [Ref. 20]

The next question asked is "How does the BP manager budget with the uncertainty involved in BP 28?" Since 1982, the projected budget estimate for BP28 has been consistently understated by $20-$30 million, resulting in significant overexecution. The reasons for low estimates are

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under study by FMSO but are obviously related to the difficulty involved in predicting actual SAC 207 ships requirements and obligations. [Ref. 20]

Due to the historical performance in BP 28 budget estimation, FMSO has adopted a practice of adding a contingency dollar amount of $30 million (to be used only for SAC 207 ships) to their projected budget estimate prior to submission to NAVSUP. [Ref. 20] Due to this excess of contingency funds being "tied up" in BP28, this practice is viewed by the authors as an area for potential NSF cash management improvement.

One possible, but not recommended, solution to this problem would be to establish a specific allotment for each SAC 207 unit. This would make the obligations predictable and eliminate the uncertainty. This would, however, require increased accounting manpower and, more importantly, could severely impact on fleet flexibility and readiness. The authors do not advocate a specific allotment spending constraint on operational SAC 207 units.

A second possible and more favorable solution to the problem would be to develop an improved method of forecasting SAC 207 unit BP28 requirements. While this would certainly be no easy task, the end result of the successful development of such a tool would be to eliminate the necessity for a $30 million contingency amount to be added to the BP28 budget estimate. This would provide a more valid picture of NSF requirements, return the contingency amount to the Treasury, and eliminate extra cash held outside the Treasury in NSF cash.

D. NSF AUTOMATED DATA PROCESSING

Automatic data processing (ADP) within the NSF has made great strides in recent years and is most certainly a key to future management improvements. Overall system upgrades have been initiated and are ongoing. It is imperative that these upgrades consider requirements from all levels of NSF management and then coordinate and integrate these requirements into a cohesive, functional, and productive system. These changes are being made and should be expedited as much as possible without sacrificing accuracy or validity. Two areas will be discussed: 1) the current upgrades in place or in process; and 2) the need to coordinate and share individual activity ADP developments.

1. ADP System Upgrade

Successful NSF cash management requires that the various stock points provide accurate and timely financial and inventory reports to the ICPs and in turn to NAVSUP, the actual manager of NSF cash. Correct financial and inventory records enable NAVSUP to better control execution of the current FY budget and allow the NSF manager to work with a more valid historical data base when estimating future obligations, expenditures and demand requirements. The end result is a more accurate forecast of NSF ending cash balances for outyear budgets. The importance of valid NSF cash forecasting was previously detailed in Chapter IV.

ADP systems are heavily integrated into the management of the NSF operation. These systems compile and provide the various reports which are forwarded to the appropriate levels to record financial and inventory status. Any problem with the ADP system at any level has the potential

to cause report submission delays, inaccuracies, and a general degradation to the overall management of the NSF. Antiquated computer hardware, increasing supply system logistics requirements, and a profusion of new financial system demands have all contributed to the necessity for development of upgraded hardware and software systems to ensure rapid and accurate response in the future.

This requirement has been recognized by NAVSUP and NAVCOMPT and programs such as Resolicitation, Stock Point ADP Replacement (SPAR), and the Integrated Disbursing and Accounting Financial Management System (IDAFMS) are currently underway to accomplish this goal. Rapid development, integration, and implementation of these programs are viewed by the authors as critical areas for NSF cash management improvement.

a. Resolicitation

Resolicitation is a NAVSUP sponsored project to enable ICPs to replace the older computer equipment which has supported the Uniform Inventory Control Program (UICP), with faster, more efficient state-of-the-art hardware and software systems. It is scheduled for completion in FY89. Resolicitation consists of four phases: 1) definition of requirements; 2) acquisition; 3) conversion/transition; and 4) resystemization. The planning stages for phase 4 have been completed and system development has commenced. A description of Resystemization is provided in the ASO Budget Execution Plan for FY85:

Resystemization involves the functional redevelopment of the UICP system to expand and improve logistics management capabilities and to exploit the advanced technology inherent in

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the new hardware and software being acquired under the ICP
Resolicitation Project. The result will be a comprehensive,
integrated, automated information processing system to support
the logistics mission of the Navy ICPs. [Ref. 43: p. II-10]

b. SPAR

A program similar to Resolicitation, called SPAR, provides for
system upgrades at the stock point level. Completion of the SPAR
program is scheduled for 1991. Benefits similar to those gained by the
ICPs through Resystemization, such as improved inventory control, will
be provided at the stock points when SPAR is implemented.

c. IDAFMS

The Integrated Disbursing and Accounting Financial Management
System (IDAFMS) is sponsored by NAVCOMPT and is scheduled for
completion in 1989. This is a program designed to develop a standard
financial system which integrates the official accounting and disbursing
data bases. Improvements in the areas of unreconciled cash, duplicate
payments, undistributed disbursements, and a general facilitation of
accounting and disbursing procedures are anticipated upon full
implementation of the IDAFMS.

The authors fully support the rapid implementation and
complete integration of upgraded ADP programs at all levels of the NSF
organization. While these upgrades are expensive both in terms of time
and money, the improvements in inventory and financial record accuracy
offered by programs such as Resolicitation, SPAR, and IDAFMS should
significantly contribute to improved NSF cash management and should be
pursued with diligence.

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2. Centralized Control of Locally Generated Programs

The increased emphasis placed upon ADP upgrade by NAVSUP and NAVCOMPT has in turn generated increased mini/micro computer usage by NSF personnel at all levels. Recent technological advances incorporating "user friendly" programming techniques have enabled the development of programs at the user level which facilitate and enhance Stock Fund management.

During interviews conducted with NSF managers at NAVCOMPT, NAVSUP, ICPs, and stock points, the authors learned of several locally generated computer programs which provide "invaluable assistance" to the manager in running his or her particular operation. Although many of these local programs have application only to the developer, the authors believe that there may be certain programs with potential application to all, or at least several, of the NSF activities. A particular program developed and currently in use at one stock point may be the answer to another stock point's problem, if only those personnel are made aware of its existence. However, when individuals were questioned as to whether or not the program had been shared with other activities, a negative response was usually received. No NSF central control system or procedure seems to exist at this time which would provide information regarding these program developments to other similar activities. This area may have potential for NSF cash management improvement. Certain locally developed programs may improve cash management at the user level. The existence of such a program should be publicized within the NSF organization so that all other field activities may take advantage of the potential improvements.

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One such program, developed two years ago at NSC San Diego for use on a Wang computer, is called the Report of Discrepancy Management Information System (RODMIS). NSC San Diego was experiencing a problem in the area of material receipt at that time with over $6 million being carried in the Material-In-Transit over 180 Days (MIT 180) account. This excessive amount was due in large part to the Report of Discrepancy (ROD) system which was then in place [Ref. 49].

Established procedures call for a ROD to be submitted by the receiving agency when receipt of material from another agency is an overage or a shortage, or when a shipment is damaged or is identified as a non-receipt. The receiving agency has already been billed by the providing agency so the contracted amount of material has been paid for out of the receiving agency's funds. A ROD is a method for the receiving agency to obtain credit from the providing agency for that portion of the material not received in proper condition or for material not received at all. The ROD system in existence at NSC San Diego two years ago was not effective in identifying these receipt discrepancies and the MIT 180 account had grown accordingly.

Development of the presently used RODMIS program and aggressive management by responsible NSC personnel have resulted in a $5 million reduction in the MIT 180 account. Credit was received for much of the material in that account from providing activities and these refunds were utilized for additional NSF purchases. The portion which was not credited was at least cleared from NSC San Diego's MIT 180 account.

The RODMIS program is one example of a locally generated program which improves cash management for the developing activity. This

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program has not officially been shared with other NSCs. The authors speculate that other beneficial programs exist at all levels of the NSF organization which should be publicized. A centralized system or set of procedures which would enable distribution of these programs to other potential users would enhance and improve NSF cash management.

E. INCENTIVE SYSTEMS

The Treasury Department cash management goal is to minimize the amount of cash held outside the Treasury Cash Account in order to reduce the amount of borrowing and the resulting interest payments on the Federal debt. Incentive systems are essential in ensuring successful achievement of any goal. In a report on cash management in the Federal government, the lack of incentive systems was cited as one of the prime contributors to ineffective cash management [Ref. 5]. The lack of goal congruent cash management incentive systems for NSF managers currently inhibits optimum cash management within the NSF.

NSF incentive system problem areas include: 1) the lack of a positive performance reporting criteria for local activities; 2) lack of incentive to take discounts; 3) use of uncontrollable or innappropriate measurement targets; and 4) existence of cash management at headquarters level only.

1. Positive Reporting Criteria

Aside from an occasional comment in a NSF managers' evaluation, there is no quantitative, positive system in place to recognize good cash management. One system which is used currently reports on the number of discounts lost and the amount of interest paid for late payments, both

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negative indicators. A better system would identify the dollar amount of discounts achieved and the total savings to the government generated by the NSF manager. By rewarding a manager commensurate with the amount of savings achieved instead of punishing him for the number of discounts missed (which could represent a very small savings) both the NSF and the Federal government would benefit. This type of positive report criteria is essential in promoting effective and goal congruent cash management within the NSF.

2. Discount Incentives

The second area deals with the lack of incentive to take discounts. Under the current budgeting and fund allotment system, if a stock point aggressively pursues discounts, the next year's budget may be cut by a like amount. If $20,000 is "saved" through discounts, the following year's obligational authority may be cut by $20,000 because less was "spent". Whether or not this would actually occur, and there are sufficient cases to indicate that it is very possible, the fact that managers believe the possibility exists serves to make them less inclined to save "too much". NSF managers must not be "penalized" by budget cuts for saving government funds. If the budget review process indicates that savings are real and repetitive then a budget cut is certainly appropriate, but the perception of penalizing for saving must be dispelled.

3. Performance Measurement Targets

The use of inappropriate measures of management performance is another area of concern. At the ICP level, the concentration on obligations vice expenditures contributes to cash management problems. ICP cash managers currently manage to the "deviation", the difference

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between customer orders and obligations. They are not responsible for, or evaluated on, the expenditure of the funds obligated and are therefore not concerned about them. They do not manage cash.

At the headquarters level, NAVCOMPT and NAVSUP manage to the outlay target, the difference between collections and expenditures. The problem, as stated in Chapter IV, is that NSF managers have no control over the actual expenditures and therefore have no control over the outlays. Measuring NSF managers' performance against a target over which they have no control does not motivate them to aggresssively pursue cash management. Performance measurement criteria at both the headquarters and the ICP levels is inappropriate and the incentive to effectively manage cash is lacking. Identification of appropriate criteria could yield an improvement in NSF cash management.

4. Decentralized Cash Management

The final area to be discussed is the decentralization of cash control and management. The current system concentrates NSF cash control at the headquarters level. If NSF cash management is a priority, consideration should be given to decentralizing the operation in order to motivate all levels of the NSF organization to "manage" cash. During interviews at the ICPs and NSCs the authors were repeatedly advised that the managers at these levels "don't really manage cash". If each ICP and stock point had, in addition to their obligational authority account, a separate cash account, the NSF managers at all levels would at least "monitor" cash and be concerned and interested in improving cash management.

Such a system would effectively be an internal control mechanism and is not without precedent or support. The Air Force currently segments their cash control into several divisions. GAO has stated that they prefer a decentralized system. DOD is only responsible to OMB for management of stock fund cash at the aggregate, service stock fund level. They do not direct the cash operations of individual service Stock Funds below the appropriations level. If the NSF cash account was decentralized and a particular sub-account (i.e., SPCC or NSC San Diego) were to go negative, DOD would not be concerned as long as the total Navy Stock Fund remained solvent. From the DOD level, each service stock fund has only one cash account. Actual situations have occurred in the past when Air Force cash control divisions went negative with no adverse DOD reaction.

The primary advantage of decentralizing cash centers on the idea that Stock Fund managers at all levels would be responsible for cash and therefore be motivated towards better management of "their" cash. Lower level forecasting of expenditures could possibly yield improved expenditure estimates summing to a more accurate NSF total estimate. A cash account would not be susceptible to the fourth quarter spending push because the excess funds would roll over to the next fiscal year. This would promote "smarter", more efficient end-of-year buying throughout the Navy.

All of the above areas deal with providing an incentive to NSF cash managers to better manage cash. The authors recommend establishment of positive reporting systems and incentives to take discounts,

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adjustment of the measurement criteria to center on controllable targets, and consideration for decentralization of cash accounts.

F. HUMAN FACTORS

The authors have included this last area of possible cash management improvement to identify some of the "softer", though no less important, management areas. In order for any system to operate more effectively there must be highly dedicated and motivated employees working together towards that goal. That quality and sense of teamwork are essential for productive improvement. Areas identified for potential improvement can be divided into three groups: 1) personnel quality and training; 2) personnel turnover; and 3) resistance to change.

1. Personnel Quality and Training

"Human error" was identified as a significant problem at every NSF activity visited by the authors. As stated before, the primary functions of NSF cash management are working well and the only potential improvements in most areas amount to "fine tuning". The minimization of human error is essential to this effort. Correction of mistakes, such as entering a charge of $37,000 for a $0.37 bolt or incorrectly filling out a collection report from a SAC 207 ship, requires excessive time and effort. Minimization of these errors requires well trained, quality people. A concentrated effort should be made to ensure that only capable, qualified personnel are performing the cash related functions and to make individuals accountable for their performance. Rewards should be given for error-free work and these rewards should be highly publicized to encourage others to strive to the same quality level of performance. A

system for advancing suggestions for improvement should be established and fully supported throughout the NSF. An aggressive training program should be pursued to ensure that the requisite talent and corporate knowledge base is maintained. Programs are in effect at every level and should be supported and monitored for correctness and completeness.

2. Personnel Turnover

Another problem area which was frequently noted, particularly at the ICP level, was personnel turnover. Entry level personnel are hired, gain experience, and advance to the GS-4 or GS-5 level. Due to the lack of middle grade billets, the majority are then forced to transfer to other jobs in order to advance further in grade. This results in a serious loss of talent and experience and causes the majority of employees to be relatively new on the job, requiring a great amount of additional training. Some adjustment of current job descriptions and GS ratings should be considered to avoid this turnover of personnel.

3. Resistance to Change

The last item concerns a small minority of employees who for various reasons are unable or unwilling to accept changes which will facilitate cash management improvements. Some are resistant to changes such as computer integration and upgrades. Phrases like "we've done it this way for 100 years and it's worked ok so far" reflect an attitude which may stand in the way of constructive change. Similarly, "If it aint broke, don't fix it" reveals a possible aversion to at least looking for potential improvements. Others actually fear computers and are unable to take advantage of a new system's potential. This fear may be the result of concern over the potential loss of a job due to automation

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or may be related to a mistrust of technological advances. Certainly, any change must be carefully thought out and tested where possible, but the ability to accept and support change is essential in a growing, evolving organization.

G. SUMMARY

Potential cash management improvements do exist for the Navy Stock Fund. While flexible standard pricing would serve to improve cash management control, the adverse effects on the stability of the current budgeting and pricing systems outweigh the benefits to be gained. Other areas which hold strong promise include the improvement of cash forecasting models and procedures. Funds released for additional requirements through obligation validation and better projections of Register 24 and SAC 207 estimates will lower the Navy Stock Fund's cash requirements and therefore the requirements of the Federal government. ADP improvements have been identified and are coming on-line. These programs and systems must be expedited in order to realize the savings potential as soon as possible. Incentive systems and human factors in personnel management and leadership must also be addressed if the NSF is to make improvements in its current cash management practices.

VI. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY

Effective cash management in the public sector minimizes the amount of cash required to be held outside the United States Treasury Cash Account. This reduces the required amount of Government borrowing and thus decreases the interest payment on the Federal debt.

The purpose of this thesis was to evaluate the cash management posture of one fiscal operation within the Department of the Navy (DON), the Navy Stock Fund, which manages in excess of $18 billion. The research aim was to identify areas of potential NSF cash management improvement which could, in turn, improve the Government cash position.

Chapter two provided a background on cash management in the public sector, discussing development of the cash management program at the Federal government level since 1970. The impact of the current cash management regulatory framework upon the Department of Defense agencies and, more specifically, the Department of the Navy, was addressed. While early payments have been effectively eliminated within DON since FY83, interest penalty payments remain a problem.

Chapter three discussed the history of the Navy Stock Fund since 1673 and provided additional background information regarding the actual NSF operation. The revolving fund concept was described as was the apportionment process which provides the NSF its obligational authority.

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The various categories of material within the Navy supply system were defined. It was pointed out that the NSF finances only secondary items. Further subclassifications of secondary items by repair capability were listed. NSF relationships with the six other stock funds were discussed and unique DLA operations for Navy customers were illustrated. The NSF organizational structure was described and it was noted that the NSF consists of ten separate Budget Projects, supervised by six project managers. A description of the inventory structure commonly found at an NSF stock point was provided and wholesale and retail inventories were defined. Obligational, financial inventory, and revolving fund accounting procedures, all common to the NSF, were discussed in detail. Finally, recent developments since 1981 which have impacted NSF operations were noted. These included: 1) Introduction of DLRs into the NSF, 2) NSF financing of Ships Overhaul Material; 3) Appropriated funds for inventory augmentation.

Chapter four examined current NSF cash management practices. Long and short range cash controls were identified and evaluated. The lack of effective short range control was noted. The fundamental areas of billings, collections, disbursements and deposits were found to be operating effectively in accordance with all government established cash management programs. NSF procedures for forecasting, pricing and budgeting were also studied and the various factors which affect these areas were presented, including those unique to DLR items. The NSF cash balance objective was found to be equal to 11 days of cash operations (based on an average daily disbursement rate). Cash position forecasting

models used by NAVSUP and NAVCOMPT to attain this objective were compared and possible advantages provided by an additional model, not currently in use, were listed.

Chapter five presented six areas which offer potential for improved cash management within the NSF: 1) flexible standard pricing; 2) forecasting; 3) accounting; 4) automated data processing; 5) incentives; and 6) human factors. It was noted that implementation of a flexible standard pricing system during the budget execution year would facilitate better control of current period cash. However, the stability of the present NSF budgeting system would be adversely affected, thus making implementation undesirable. Within the remaining five areas, actions were identified which would better enable NSF managers to control their cash.

B. CONCLUSIONS

The authors' findings, generated from research conducted during the last six months, are summarized in the following conclusions:

1. <u>The NSF systems for billings, collections, disbursements, and deposits are working effectively in accordance with all Federally established programs</u>. Potential for minor improvement exists but no actions which would result in major cash management improvements were identified in these areas.

2. <u>Short term control of NSF cash is ineffective at all levels</u>. The long term controls of forecasting and pricing are the only real control available to NSF managers. As discussed in Chapter IV, section B, the need for short term control is essential if the NSF managers are to effectively manage cash. Short term controls were identified in the form of: 1) loans or transfers; 2) adjusting

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standard prices and/or surcharges; 3) altering transaction and processing rates; and 4) restricting obligational authority. Each of these controls was discussed with all but loans and transfers being identified as infeasible given the present NSF structure and operations. Transfers between stock funds have been discontinued and loans are only a temporary fix for a cash shortage or excess. Therefore, no effective short term controls exist.

3. <u>Implementation of a flexible standard pricing system would improve control of current period cash but would adversely impact the stability of the current NSF budgeting process.</u> Prices are set in the initial budget submission for a fiscal year in order to achieve the required 11-day operating cash objective. They are reset in September, just prior to the execution year, in order to balance with the customers' budgets, and are held constant throughout the execution year in order to protect "program" and the Navy's Total Obligational Authority (TOA). While mid-year price changes would afford better control over current period cash flow and position, they could result in a loss of budgeted program if the customer could not afford to pay for his approved requirements due to higher prices. Additionally, the Navy could lose budget credibility in Congress for not being able to execute their budgeted programs.

4. <u>NSF end-of-period cash forecasts are inaccurate and need improvement.</u> The importance of accuracy in these forecasts is implicit in their applications. If the cash forecast is not accurate the entire pricing and budgeting system will suffer. As noted in Table 8, cash forecasts for outlays were in error by factors of 14 and 5.5 in FY84 and FY85, respectively. These are significant variances and, given the total amount of funds in the NSF, represent a large amount of cash. The $588 million cash excess in FY85 represents a good deal of "program" not bought by the Navy and, in the macro view, a large sum that the Treasury would not have had to borrow if the forecast had been more accurate.

5. <u>Automated data processing (ADP) system upgrades should enhance NSF cash management.</u> ADP within the NSF has made great strides

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in recent years and is certainly a key to future management improvements. Overall system upgrades have been initiated and are ongoing. Improvements in inventory and financial record accuracy will lead to better control and budget execution of NSF cash. Better data will result in better forecasts with the resulting benefits as mentioned above. Implementation of these ADP system upgrades should be expedited as much as possible, without sacrificing accuracy or validity, in order to take advantage of these benefits at the earliest date.

6. Incentive systems for NSF cash mangers need improvement at all levels. Incentive systems are essential in ensuring achievement of any goal. The lack of goal congruent incentive systems has been cited as a problem which inhibits effective cash management within the Federal government. NSF managers below the level are not currently tasked with managing cash. They manage to the deviation between customer orders and obligations and do not get involved in the actual expenditure of funds, the cash outflow. Additionally, current performance measurement criteria for NAVSUP and NAVCOMPT NSF managers (outlay target) is not based upon factors which they can control (expenditures). This lack of goal congruent incentive systems results in less than optimal cash management within the NSF.

7. Minimization of human error is a key factor toward improving NSF cash management. Much time and energy is currently expended in correcting simple transposition or entry errors made when recording and reporting NSF transactions. If these human errors could be minimized, not only would the accuracy of NSF accounting and reporting system be improved, but the manpower currently required to correct these errors could be put to more efficient use within the NSF.

None of the conclusions listed above come as any great surprise. Many of the areas which present problems to the NSF cash management effort are common to other organizations and have been identified in previous cash management studies. Given the considerable attention at the Federal

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level towards billings, collections, disbursements, and deposits during the recent past, significant problems in these basic areas were neither expected nor found.

Short term cash control is critical for successful cash management. It is also the most difficult control to achieve within the NSF. Flexible standard pricing is acknowledged as a potential short term control but it may be inappropriate due to stability constraints in the DOD and Federal budgeting system. The existing management tools of pricing and forecasting, confined to the long range horizon, do not offer NSF managers sufficient control over cash flow or position in the execution year.

The requirements for improved forecasts and improved ADP systems are obvious and have received wide-spread attention. Benefits of these improvements are well documented as is the high price tag associated with their implementation. Follow-on studies in these areas will most likely be conducted and should further "fine tune" NSF cash management.

The more subjective areas of incentive systems and human factors offer definite possibilities for improvement. Unfortunately, these areas are too often overlooked and do not receive the publicity or attention that they deserve. The benefits to be gained from improvements in these areas should be realized at little additional cost to the government. Increased awareness and a willingness to make changes are required initial steps towards improved NSF cash management. The desire, motivation, and incentive must be created to encourage NSF managers to make these necessary improvements and achieve the goal of better cash management within the NSF.

C. RECOMMENDATIONS

The following recommended actions would contribute to improving overall NSF cash management operations and additionally would assist in reducing Federal borrowing requirements and the resultant debt interest payments:

1. <u>A more accurate model for NSF cash position forecasting should be developed.</u> This would result in a more accurate NSF end-of-period cash forecast, which would aid NSF managers in achieving the established 11-day operating cash objective. Cash excesses over this target as occurred in FY84 and FY85 could possibly be reduced or eliminated. Further, with improved accuracy, the NSF managers may be able to reduce the operating cash objective to a level below the current 11-day requirement, thereby reducing the amount of NSF cash required to be held outside the Treasury.

2. <u>Obligation validation (Obs Val) procedures at ICP/stock point levels should be intensified.</u> Obligation validation procedures release funds which have been tied up in invalid obligations. In FY84 these funds at SPCC alone amounted to $63 million, which equates to 3% of that ICP's total unliquidated obligations. An additional reward from intensified Obs Val efforts would be a more accurate obligation prediction used in the current NSF forecast models to generate forecasted expenditures. The benefits of improved forecasts have been cited in the previous paragraph.

3. <u>Production lead time (PLT) should be included in procurement contracts.</u> Production lead time is the primary component of financial lead time (FLT), the most significant variable in deriving expenditures from obligations. By including PLT in the procurement contract, PLT can be better defined, allowing FLT to be reduced to a more predictable value, resulting ultimately in a more accurate expenditure forecast.

4. _A system which will enable tracking of a specific obligation_
   through to expenditure should be developed. FLT is the time
   between an obligation and its corresponding expenditure. Such a
   system would eliminate much of the guesswork in FLT estimates by
   establishing a real-world historical distribution data base. This
   data could then be analyzed to identify outliers and adjustments to
   predictions could be made accordingly. This would allow for better
   estimates of a mean FLT to be used in forecasting and would also
   provide a standard deviation for use in calculating confidence
   intervals for NSF end-of-period cash projections. Once again,
   improved NSF forecasts would be the real benefit of this system.

5. _Better forecasting methods should be developed in two additional_
   areas: 1) Register 24 collection estimates; and 2) BP28
   obligation estimates for SAC 207 units. Register 24 estimates are
   used to smooth out the effects of late collection reports from
   Centrally Managed Account (CMA) user activities. FY85 estimates
   were between 30% and 36% above the actual collections. In the
   second area, due to the uncertainty of SAC 207 ship obligations
   since 1982, initial BP28 obligation estimates have been
   consistently understated by $20-30 million. Due to this historical
   performance in BP28 budget estimation, FMSO has adopted a
   practice of adding a contingency dollar amount of $30 million to
   their budget estimate prior to submission to NAVSUP. Improved
   methods of forecasting in these two areas will result in more
   accurate accounting, requirements estimation, and budgeting of NSF
   cash, which will, in turn, yield better cash management.

6. _Rapid implementation and integration of ADP upgrades should be_
   pursued at all NSF levels. Several ADP improvement programs are
   ongoing including: 1) Resolicitation; 2) SPAR; and 3) IDAFMS. The
   improvements in inventory and financial record accuracy offered by
   such programs would enable better control and execution of current
   fiscal year budgets. This would further allow NSF managers to
   work with more valid historical data bases in estimating future
   obligations, expenditures, and demand requirements. The end result
   would be a more accurate forecast of NSF end-of-period cash
   balances for out-year budgets.

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7. **A central NSF system to control, monitor, and distribute locally generated ADP cash management programs should be established.** Recent technological advances incorporating user friendly programming techniques have enabled the development of programs at the user level which facilitate and enhance stock fund management. Certain of these local programs may enhance cash management. One such program is RODMIS which was developed at NSC San Diego, Ca., and resulted in a $5 million dollar reduction the Material-in-Transit (over 180 days) account. Due to aggressive management use of this program, credit was received from providing activities for much of the material previously in that account. These refunds were then used for additional purchases. A centralized system or set of procedures which would enable distribution of programs such as this to other potential users would enhance and improve NSF cash management.

8. **Cash management incentive systems within the NSF should be improved.** The current system of incentives does not positively encourage NSF managers to pursue better cash management. Examples of specific areas for improvement include: 1) incentives to maximize the dollar value vice the number of discounts taken; 2) identification of appropriate measurement criteria for cash management performance which reflects factors over which the NSF managers actually have control; 3) decentralization of NSF cash in order to motivate NSF managers at all levels to better manage "their" cash, to be responsible for cash at the lower levels, and to encourage "bottom-up" forecasting of NSF cash.

9. **Upward mobility at NSF activities for those in mid-level cash management positions should be increased.** Due to a shortage of middle grade billets, the majority of employees are forced to transfer to other jobs in order to advance further in grade. This results in a serious loss of talent and corporate knowledge which necessitates increased time and effort to train the newer entry level replacements. The end result is a less effective cash management effort due to this consistent personnel turnover.

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10. **Efforts to reduce "human error" at all NSF levels should be increased.** "Human error" was identified as a significant problem at every NSF activity visited by the authors. Uncorrected "entry" errors could result in millions of dollars of NSF cash being misstated or improperly accounted for. Correction of such mistakes requires excessive time and effort. In order to minimize such errors, improvements in the following areas should be considered: 1) ensure only high quality personnel are performing the cash management functions; 2) make individuals accountable for their performance; 3) highly publicized rewards should be given for error free work to encourage others to strive for the same quality level of performance; and 4) an aggressive training program should be pursued to insure that the requisite talent and corporate knowledge base is maintained. Minimization of "human error" is essential in order to "fine tune" NSF cash management.

Specific benefits to be realized from each of the above recommendations are not easy to quantify. The costs, in some instances are readily available and identifiable. For others, they are more obscure. These uncertainties make any kind of cost-benefit analysis difficult at best. Further study may provide better estimates of the feasibility and costs associated with implementation of each recommendation.

Some of the above recommendations, such as the ADP and forecasting improvements, would be costly and time consuming to implement while others, such as training efforts and incentive related issues, should cost less. Note that the ADP upgrades are ongoing and the benefits realized should outweigh the additional costs of initiating these recommendations. The forecasting improvements are heavily dependent on these same ADP systems and should reflect similar benefits.

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The complex nature of cash management within the Navy Stock Fund makes it difficult to separate the various related factors which impact the NSF cash levels. This thesis has attempted to identify those areas which can be modified to improve the management and control of NSF cash. The above recommendations would contribute to improving overall NSF cash management operations. In addition, they would result in the reduction of Federal borrowing and debt interest payments. If these improvements are effectively instituted, all parties, including Treasury, Navy, and the American taxpayers, will benefit from the actions taken.

APPENDIX A

NSF FINANCIAL FORECASTING MODEL PREDICTION METHODOLOGY

Transaction or Account	Description of Calculation
1) Customer Orders	Standard: For each Budget Project, a total fiscal year plan figure is stored in the Parameter File for the current and subsequent fiscal years. These figures are broken down into monthly predictions using seasonal factors also stored in the Parameter File for each BP.

Individual Budget Project predictions are then summed to produce higher level predictions, e.g., Total NSF, FMSO, Wholesale, etc.

If the forecast is being made after the FY has commenced, no compensation for the actual rate of Orders to-date is made, i.e., if X months remain in the FY, the total FY plan figure is multiplied by X/12 and this amount is spread over the remaining X months using the X seasonal factors for these remaining months, normalized so that their sum is one. Note: this will produce a cumulative total FY Orders prediction which in most cases will **not** exactly equal the FY plan figure.

Option #1: Compensates for actual Customer Orders values for the current fiscal year to-date, i.e., cumulative Orders to-date are subtracted from the total current fiscal year plan figure and the difference is then spread over the remaining months of the FY using seasonal factors. Note: this will

produce a cumulative total FY Orders prediction which will <u>always</u> equal the FY plan figure.

<u>Option #2</u>: Overrides the application of seasonal factors and accepts specific monthly estimates for Orders in any or all BP's for any or all months in the forecast horizon. Any unspecified months are calculated by the <u>Standard method</u> above, after inserting the override values.

<u>Option #3</u>: Overrides the application of seasonal factors and accepts specific monthly estimates for Orders in any or all BP's. for any or all moonths in the forecast horizon. Any unspecified months are calculated by <u>Option #1</u> above. after inserting the override values (i.e., in the method of Options #1, the override values are treated as if they were actuals).

2) Change in Unfilled Customer Orders

Input directly for each month for each BP. Higher level predictions are produces by summing individual Budget Projects.

3) Unfilled Customer Orders

Calculated recursively for each BP from current actual Unfilled Customer Orders and monthly predictions of Changes in Unfilled Customer Orders. Higher level predictions are produced by summing individual Budget Projects.

4) Sales

Calculated for each BP as predicted monthly Customer Orders minus any predicted Change in Unfilled Customer Orders for the month. Higher level predictions are produced by

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summing individual Budget Projects. Note: a *positive* Change in Unfilled Customer Orders results in a *smaller* Sales figure for the month.

5) Change in Accounts Receivable

Input directly for each month, for the Total NSF level only.

6) Accounts Receivable

Calculated recursively at the Total NSFLevel from current actual Accounts Receivable and monthly predictions of Changes in Accounts Receivable.

7) Special Collections

Input directly for each month for the Total NSF level (Special Collections include foreign military sales investments, advances from O&M,N, etc.).

8) Collections

Calculated at the Total NSF level as predicted monthly Saled minus any predicted Change in Accounts Receivable plus any predicted Special Collections. Note: a *positive* Change in Accounts Receivable results in a *smaller* Collections figure for the month.

9) Obligations

Standard: This method maintains the current approved Orders/Obs Deviation as a fixed link between forecasted total FY Customer Orders and forecasted Total FY Obligations. For each BP, the Orders/Obs Deviation (see next entry in table) is then computed from plan data in the Parameter File and subtracted from *forecasted* Total FY Customer Orders (which may or may not be equal to the Total FY Customer Orders *plan* figure, depending on which forecasting option was chosen for Customer Orders). The result is forecasted

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Total FY Obligations for the current FY. Any difference between this figure and the total of cumulative actual obligations to-date and remaining monthly obligation plan figures for the FY is then distributed proportionately across the remaining monthly obligation plan figures. In the case of wholesale BP's 14 and 34, this distribution will affect only the Replenishment plan figures. Monthly predictions for any initial months of the subsequent FY are taken directly from monthly plan data. Higher level predictions are produced by summing individual Budget Projects.

Option #1: Monthly Obligation plan figures stored in the Parameter File are used directly for predicting all remaining months of the current FY and any initial months of the subsequent FY. Wholesale BP's 14 and 34 are broken by Provisioning and Replenishment. Higher level predictions are produced by summing individual Budget Projects. Note: depending on which forecasting option is used for Customer Orders, this method will usually result in a new Deviation figure (see Orders/Obs Deviation below).

10) Orders/Obs Deviation   Only applicable under the Total FY column at the BP level. Will always appear as the difference between forecasted Total FY Customer Orders and forecasted Total FY Obligations. Actual computation, however, will vary with the forecasting option chosen for Obligations. Under the Standard method, the current approved Deviation is computed as the difference between the Total FY

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Customer Orders plan figure and the sum of
FY Obligation monthly plan figures (both of
which are stored in the Parameter File). If
orders are larger, Deviation is positive; if
Obligations are larger, Deviation is negative.
Under Option #1, the Deviation is a forced
figure computed exactly as it appears, i.e.,
the difference between forecasted Total FY
Customer Orders and forecasted Total FY
Obligations.

11) Expenditures

Standard: Calculated for each BP by applying
monthly financial leadtime (FLT) distribution
weights (stored in the Parameter File) to
actual and/or predicted Obligations in the
current and prior months. Higher level
predictions are produced by summing
individual Budget Projects.

Option #1: Overrides the application of FLT
distribution methodology and accepts
specific monthly estimates for Expenditures
in any or all BP's, for any or all months in the
forecast horizon. Any unspecified months
are calculated by the Standard method above

12) Outstanding
Obligations

Calculated recursively for each BP from last
month's actual or predicted Outstanding
Obligations plus predicted Obligations for
the current month, less predicted
Expenditures for the current month. Higher
level predictions are produced by summing
individual Budget Projects.

13) Cash Transfers

Input directly for each month for the BP and
Total NSF levels (e.g., transfers to/from
DLA). BP level inputs will be summed to the

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Inventory Manager and the Wholesale/Retail
levels, but will not necessarily add to the
Total NSF level, since the figure at the Total
NSF level is in all cases a separate input
including amounts not identifiable to the BP
level.

14) Cash Impact   Calculated only at the BP level as predicted
monthly Sales less predicted monthly
Expenditures plus any Cash Transfers.

15) Cash Balance   Calculated at the Total NSF level as the
previous month's actual or predicted Cash
Balance plus predicted Collections for the
current month less predicted Expenditures
for the current month plus or minus any
predicted Cash Transfers for the current
month. When a sufficient number of
forecasts have been stored in the Predictions
File, upper and lower limits will be computed
for each Cash Balance prediction.

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NAVSUP FORECASTING MODEL OUTPUT & FORMULAS

** NSF FY 84 ACTUAL **

BP/ACCOUNT		ORDERS	SALES	OBS CP	COMMIT	TARGET	O/O DEV	CASH BF	OBS BF
BP 14:	OPS	419.2	446.0	432.7	169.0	501.7	-13.5	-+-	658.3
	INV			29.9		29.9	-29.9	-+-	31.1
	PWR			21.2		21.2	-21.2	-+-	1.4
	*TOT	419.2	446.0	483.8	169.0	652.8	-64.6	-+-	690.8
BP 15:	OPS	14.2	14.1	13.6	0.5	14.1	0.6	-+-	9.0
	INV					0.0	0.0	-+-	
	PWR					0.0	0.0	-+-	
	*TOT	14.2	14.1	13.6	0.5	14.1	0.6	-+-	9.0
BP 21:	*TOT	906.6	906.6	931.3	30.0	961.3	-24.7	-+-	44.7
BP 23:	*TOT	9.7	9.7	161.9	25.0	186.9	-152.2	-+-	0.0
BP 25:	*TOT	2.3	2.3	0.1	0.0	0.1	2.2	-+-	1.0
BP 28:	OPS	1393.9	1385.0	1480.2	139.0	1619.2	-86.3	-+-	214.9
	INV			52.6		52.6	-52.6	-+-	0.0
	PWR			45.8		45.8	-45.8	-+-	0.0
	*TOT	1393.9	1385.0	1578.6	139.0	1717.6	-184.7	-+-	214.3
BP 34:	OPS	895.1	850.5	811.3	251.9	1063.2	83.8	-+-	943.9
	INV			136.7		136.7	-136.7	-+-	43.3
	PWR			11.2		11.2	-11.2	-+-	19.0
	*TOT	895.1	850.5	959.2	251.9	1211.1	-64.1	-+-	1006.2
BP 38:	OPS	2183.6	2183.6	2213.2	449.8	2663.0	-23.6	-+-	136.9
	INV			7.7		7.7	-7.7	-+-	
	PWR					0.0	0.0	-+-	
	*TOT	2183.6	2183.6	2220.9	449.8	2670.7	-37.3	-+-	136.9
BP 81:	PRC	826.1	745.7	795.1	312.9	1108.0	31.0	-+-	1242.6
	RMK			239.7		239.7	-239.7	-+-	179.7
ST	OPS	-+-	-+-	1034.8	-+-	1347.7	-208.7	-+-	1422.3
	INV			99.8		99.8	-99.8	-+-	61.3
	PWR			48.9		48.9	-48.9	-+-	3.9
	*TOT	826.1	745.7	1183.5	312.9	1496.4	-357.4	-+-	1487.5
BP 85:	PRC		0.0			0.0	0.0	-+-	
	RMK					0.0	0.0	-+-	
ST	OPS	-+-	-+-	0.0	-+-	0.0	0.0	-+-	0.0
	INV					0.0	0.0	-+-	
	PWR					0.0	0.0	-+-	
	*TOT	0.0	0.0	0.0	0.0	0.0	0.0	-+-	0.0
NSF:	A/R		-55.7						
	OPS	6650.7	6543.5	6839.4	1378.1	8217.5	-188.7	-+-	3251.3
	RMK	0.0	0.0	239.7	0.0	239.7	-239.7	-+-	179.7
	*OPS	6650.7	6487.8	7079.1	1378.1	8457.2	-428.4	538.0	3431.0
	*INV	0.0	0.0	326.7	0.0	326.7	-326.7	0.0	135.7
	*PWR	0.0	0.0	127.1	0.0	127.1	-127.1	124.4	24.3
*TOTAL	NSF	6650.7	6487.8	7532.9	1378.1	8911.0	-882.2	662.4	3591.0

FLT	EXPEND	OUTLAY	APPROP	XFERS	OBS CF	CASH CF	CASH OBJ

* IGNORE FLTS, USED FOR COMPUTATION OF EXPENDITURES

FLT	EXPEND	OUTLAY	APPROP	XFERS	OBS CF	CASH CF	CASH OBJ	
23.8	332.2	-113.8	-+-	-+-	758.8	-+-		* OBS CF INCLUDES $119.7 FOR LONG
-1.1	31.1	31.1	100.8	-+-	29.9	-+-		LEAD TIME MATERIAL
17.0	1.0	1.0	2.2	-+-	21.6	-+-		
-+-	364.3	-81.7	103.0	-+-	810.3	-+-		
8.7	12.7	-1.4	-+-	-+-	9.9	-+-		
	0.0	0.0		-+-	0.0	-+-		
	0.0	0.0		-+-	0.0	-+-		
-+-	12.7	-1.4	0.0	-+-	9.9	-+-		
1.2	883.0	-23.6	-+-	-+-	93.0	-+-		
8.4	48.6	38.9	-+-	-+-	113.3	-+-		
0.0	1.1	-1.2	-+-	-+-	.0	-+-		
1.9	1458.1	73.1	-+-	-+-	237.0	-+-		* $135.7 OF $590.5 INV BUILD APPROPRIATION
1.1	47.8	47.8	69.5	-+-	4.8	-+-		IS EXPENDITURES BASED
2.6	35.7	35.7	19.1	-+-	10.1	-+-		BP 14 31.1
-+-	1541.6	156.6	88.6	-+-	251.9	-+-		BP 34 43.3
								BP 81 61.3
22.0	514.4	-336.1	-+-	-+-	1240.8	-+-		
12.0	43.3	43.3	186.0	-+-	136.7	-+-		
22.5	10.1	10.1	11.2	-+-	20.1	-+-		
-+-	567.8	-282.7	197.2	-+-	1397.6	-+-		
0.6	2244.7	61.1	-+-	-+-	105.4	-+-		* $62.0 REFUNDED TO O&MN REDUCES BP38
	7.7	7.7	7.7	-+-	0.0	-+-		ORDERS AND SALES
	0.0	0.0		-+-	0.0	-+-		
-+-	2252.4	68.8	7.7	-+-	105.4	-+-		
29.0	514.5	-231.2	-+-	-+-	1523.2	-+-		
11.0	199.7	199.7	-+-	-+-	219.7	-+-		
-+-	714.2	-31.5	-+-	-+-	1742.9	-+-		
12.0	61.3	61.3	226.5	-+-	99.8	-+-		
19.1	2.5	2.5	9.9	-+-	50.3	-+-		
-+-	778.0	32.3	236.4	-+-	1893.0	-+-		
	0.0	0.0	-+-	-+-	0.0	-+-		
	0.0	0.0	-+-	-+-	0.0	-+-		
-+-	0.0	0.0	-+-	-+-	0.0	-+-		
	0.0	0.0		-+-	0.0	-+-		
	0.0	0.0		-+-	0.0	-+-		
-+-	0.0	0.0	0.0	-+-	0.0	-+-		

FLT	EXPEND	OUTLAY	APPROP	XFERS	OBS CF	CASH CF	CASH OBJ	
		55.7						* APPROXIMATELY $128.1 INV AUG OBS CARRY FORWARD
-+-	6009.3	-534.2	-+-	-+-	4081.4	-+-		TO FY85
-+-	199.7	199.7	-+-	-+-	219.7	-+-	11 DAYS	
-+-	6209.0	-278.8	-+-	-+-	4301.1	816.8	189.7	
-+-	191.2	191.2	590.5	-+-	271.2	399.3	15 DAYS	
-+-	49.3	49.3	42.4	-+-	102.1	117.5	258.7	
-+-	6449.5	-38.3	632.9	0.0	4674.4	1333.6		* TOTAL UNDER SALES COLUMN REPRESENTS COLLECTIONS

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** NSF FY 84 ACTUAL **

```
************   *******                                  *******
BP/ACCOUNT    ORDERS                                    SALES
************   *******                                  *******

BP 14:   OPS                                     419.2
         INV
         PWR
         *TOT   @SUM(B7..B9)                            @SUM(C7..C9)

BP 15:   OPS                                      14.2
         INV
         PWR
         *TOT   @SUM(B12..B14)                          @SUM(C12..C14)

BP 21:   *TOT                                    906.6

BP 23:   *TOT                                      9.7

BP 25:   *TOT                                      2.3

BP 28:   OPS                                    1393.9
         INV
         PWR
         *TOT   @SUM(B23..B25)                          @SUM(C23..C25)

BP 34:   OPS                                     895.1
         INV
         PWR
         *TOT   @SUM(B28..B30)                          @SUM(C28..C30)

BP 38:   OPS                                    2183.6
         INV
         PWR
         *TOT   @SUM(B33..B35)                          @SUM(C33..C35)

BP 81:   PRC                                     826.1
         RMK
         ST OPS              -+-                                    -+-
         INV
         PWR
         *TOT   @SUM(B38..B42)                          @SUM(C38..C42)

BP 85:   PRC
         RMK
         ST OPS              -+-                                    -+-
         INV
         PWR
         *TOT   @SUM(B45..B49)                          @SUM(C45..C49)

************   *******                                  *******
NSF:     A/R
         OPS   @SUM(B7+B12+B17+B19+B21+B23+B28+B33+B38+B45) @SUM(C7+C12+C17+C19+C21+C23+C28+C33+C38+C45)
         RMK   +B39+B46                                +C39+C46
         *OPS   +B64+B55                                +C54+C55+C53
         *INV   @SUM(B8+B13+B24+B29+B34+B41+B48)        @SUM(C8+C13+C24+C29+C34+C41+C48)
         *PWR   @SUM(B9+B14+B25+B30+B35+B42+B49)        @SUM(C9+C14+C25+C30+C35+C42+C49)

*TOTAL   NSF   @SUM(B56..B58)                           @SUM(C56..C58)
```

```
446                 432.7                           169
                    29.9
                    21.2
        @SUM(D7..D9)                @SUM(E7..E9)

14.1                13.6                            0.5


        @SUM(D12..D14)              @SUM(E12..E14)

906.6               931.3                            30

9.7                 161.9                            25

2.3                 0.1                              0

1385                1400.2                          139
                    52.6
                    45.8
        @SUM(D23..D25)              @SUM(E23..E25)

850.5               811.3                          251.9
                    136.7
                    11.2
        @SUM(D28..D30)              @SUM(E28..E30)

2183.6              2213.2                          449.8
                    7.7

        @SUM(D33..D35)              @SUM(E33..E35)

745.7               795.1                          312.9
                    239.7
        +D38+D39                              -0-
                    99.8
                    48.9
        @SUM(D40..D42)              @SUM(E38..E42)

  0

        +D45+D46                              -0-


        @SUM(D47..D49)             @SUM(E45..E49)

        ******                     ******
-55.7
        @SUM(D7+D12+D17+D19+D21+D23+D28+D33+D38+D45) @SUM(E7+E12+E17+E19+E21+E23+E28+E33+E38+E45)
        +D39+D46                   +E39+E46
        +D54+D55                   +E54+E55
        @SUM(D8+D13+D24+D29+D34+D41+D48) @SUM(E8+E13+E24+E29+E34+E41+E48)
        @SUM(D9+D14+D25+D30+D35+D42+D49) @SUM(E9+E14+E25+E30+E35+E42+E49)

        @SUM(D56..D58)             @SUM(E56..E58)
```

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*******	*******	*******	*******
TARGET	O/O DEV	CASH BF	CBS BF
*******	*******	*******	*******

+D7+E7	+B7-D7	-+-	
+D8+E8	+B8-D8	-+-	
+D9+E9	+B9-D9	-+-	
@SUM(F7..F9)	@SUM(G7..G9)	-+-	@SUM(I7..I9)
+D12+E12	+B12-D12	-+-	
+D13+E13	+B13-D13	-+-	
+D14+E14	+B14-D14	-+-	
@SUM(F12..F14)	@SUM(G12..G14)	-+-	@SUM(I12..I14)
+D17+E17	+B17-D17	-+-	
+D19+E19	+B19-D19	-+-	
+D21+E21	+B21-D21	-+-	
+D23+E23	+B23-D23	-+-	
+D24+E24	+B24-D24	-+-	
+D25+E25	+B25-D25	-+-	
@SUM(F23..F25)	@SUM(G23..G25)	-+-	@SUM(I23..I25)
+D28+E28	+B28-D28	-+-	
+D29+E29	+B29-D29	-+-	
+D30+E30	+B30-D30	-+-	
@SUM(F28..F30)	@SUM(G28..G30)	-+-	@SUM(I28..I30)
+D33+E33	+B33-D33	-+-	
+D34+E34	+B34-D34	-+-	
+D35+E35	+B35-D35	-+-	
@SUM(F33..F35)	@SUM(G33..G35)	-+-	@SUM(I33..I35)
+D38+E38	+B38-D38	-+-	
+D39+E39	+B39-D39	-+-	
+F38+F39	+G38+G39	-+-	+I38+I39
+D41+E41	+B41-D41	-+-	
+D42+E42	+B42-D42	-+-	
@SUM(F40..F42)	@SUM(G40..G42)	-+-	@SUM(I40..I42)
+D45+E45	+B45-D45	-+-	
+D46+E46	+B46-D46	-+-	
+F45+F46	+G45+G46	-+-	+I45+I46
+D48+E48	+B48-D48	-+-	
+D49+E49	+B49-D49	-+-	
@SUM(F47..F49)	@SUM(G47..G49)	-+-	@SUM(I47..I49)
*******	*******	*******	*******
+D54+E54	+B54-D54	-+-	@SUM(I7+I12+I17+I19+I21+I23+I28+I33+I38+I45)
+D55+E55	+B55-D55	-+-	+I33+I46
+D56+E56	+B56-D56	538	+I54+I55
+D57+E57	+B57-D57	0	@SUM(I8+I13+I24+I29+I34+I41+I48)
+D58+E58	+B58-D58	124.4	@SUM(I9+I14+I25+I30+I35+I42+I49)

@SUM(F56..F58) @SUM(G56..G58) @SUM(H56..H58) @SUM(I56..I58)

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			FLT	EXPEND		OUTLAY	ACCRED			XFERS

658.3 23.78 @ROUND(@IF(J7)12,I7*12/J7,D7*(1-J7/12)+I7),1)   +K7-C7   -*-   -*-
31..   12 @ROUND(@IF(J8)12,I8*12/J8,D8*(1-J8/12)+I8),1)   +K8-C8   100.8 -*-
1.4   17 @ROUND(@IF(J9)12,I9*12/J9,D9*(1-J9/12)+I9),1)   +K9-C9   2.2 -*-
-*-   @SUM(K7..K9)   @SUM(L7..L9)   @SUM(Y8+Y9)   -*-

9   8.7 @ROUND(@IF(J12)12,I12*12/J12,D12*(1-J12/12)+I12),1) +K12-C12   -*-   -*-
        @ROUND(@IF(J13)12,I13*12/J13,D13*(1-J13/12)+I13),1) +K13-C13   -*-
        @ROUND(@IF(J14)12,I14*12/J14,D14*(1-J14/12)+I14),1) +K14-C14   -*-
-*-   @SUM(K12..K14)   @SUM(L12..L14)   @SUM(Y12+Y14)   -*-

44.7 1.198 @ROUND(@IF(J17)12,I17*12/J17,D17*(1-J17/12)+I17),1) +K17-C17   -*-   -*-

0   5.335 @ROUND(@IF(J19)12,I19*12/J19,D19*(1-J19/12)+I19),1) +K19-C19   -*-   -*-

1   0 @ROUND(@IF(J21)12,I21*12/J21,D21*(1-J21/12)+I21),1) +K21-C21   -*-   -*-

214.9 1.521 @ROUND(@IF(J23)12,I23*12/J23,D23*(1-J23/12)+I23),1) +K23-C23   -*-   -*-
2   1.1 @ROUND(@IF(J24)12,I24*12/J24,D24*(1-J24/12)+I24),1) +K24-C24   69.5 -*-
8   2.65 @ROUND(@IF(J25)12,I25*12/J25,D25*(1-J25/12)+I25),1) +K25-C25   13.1 -*-
-*-   @SUM(K23..K25)   @SUM(L23..L25)   @SUM(Y24+Y25)   -*-

943.9 22.021 @ROUND(@IF(J28)12,I28*12/J28,D28*(1-J28/12)+I28),1) +K28-C28   -*-   -*-
43.3   12 @ROUND(@IF(J29)12,I29*12/J29,D29*(1-J29/12)+I29),1) +K29-C29   186 -*-
19 22.5129 @ROUND(@IF(J30)12,I30*12/J30,D30*(1-J30/12)+I30),1) +K30-C30   11.2 -*-
-*-   @SUM(K28..K30)   @SUM(L28..L30)   @SUM(Y29+Y30)   -*-

136.9 8.5713 @ROUND(@IF(J33)12,I33*12/J33,D33*(1-J33/12)+I33),1) +K33-C33   -*-   -*-
        @ROUND(@IF(J34)12,I34*12/J34,D34*(1-J34/12)+I34),1) +K34-C34   7.7 -*-
        @ROUND(@IF(J35)12,I35*12/J35,D35*(1-J35/12)+I35),1) +K35-C35   -*-
-*-   @SUM(K33..K35)   @SUM(L33..L35)   @SUM(Y34+Y35)   -*-

1242.6 28.98 @ROUND(@IF(J38)12,I38*12/J38,D38*(1-J38/12)+I38),1) +K38-C38   -*-   -*-
179.7   11 @ROUND(@IF(J39)12,I39*12/J39,D39*(1-J39/12)+I39),1) +K39-C39   -*-   -*-
-*-   +K38+K39   +L38+L39   -*-
61.3   12 @ROUND(@IF(J41)12,I41*12/J41,D41*(1-J41/12)+I41),1) +K41-C41   226.5 -*-
3.9   19.1 @ROUND(@IF(J42)12,I42*12/J42,D42*(1-J42/12)+I42),1) +K42-C42   9.9 -*-
-*-   @SUM(K41..K42)   @SUM(L41..L42)   @SUM(Y41+Y42)   -*-

        @ROUND(@IF(J45)12,I45*12/J45,D45*(1-J45/12)+I45),1) +K45-C45   -*-   -*-
        @ROUND(@IF(J46)12,I46*12/J46,D46*(1-J46/12)+I46),1) +K46-C46   -*-   -*-
-*-   +K45+K46   +L45+L46   -*-
        @ROUND(@IF(J48)12,I48*12/J48,D48*(1-J48/12)+I48),1) +K48-C48   -*-
        @ROUND(@IF(J49)12,I49*12/J49,D49*(1-J49/12)+I49),1) +K49-C49   -*-
-*-   @SUM(K47..K49)   @SUM(L47..L49)   @SUM(Y48+M49)   -*-

                         +K53-C53
-*-   @SUM(K7+K12+K17+K19+K21+K23+K28+K33+K38+K45)   +L54-C54   -*-   -*-
-*-   +K39+K46   +K55-C55   -*-
-*-   +K54+K55   +K56-C56   -*-   -*-
-*-   @SUM(K8+K13+K24+K29+K34+K41+K48)   +K57-C57   @SUM(Y8+M13+M24+M29+M34+M41+M48)   -*-
-*-   @SUM(K9+K14+K25+K30+K35+K42+K49)   +K58-C58   @SUM(Y9+M14+M25+M30+M35+M42+M49)   -*-

-*-   @SUM(K56..K58)   +K52-C52   +Y57+Y58   +N56

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OBS CF	CASH CF	CASH OBJ
+B7+I7-K7	-+-	
+B8+I8-K8	-+-	
+D9+I9-K9	-+-	
@SUM(O7..O9)	-+-	
+D12+I12-K12	-+-	
+D13+I13-K13	-+-	
+D14+I14-K14	-+-	
@SUM(O12..O14)	-+-	
+D17+I17-K17	-+-	
+D19+I19-K19	-+-	
+D21+I21-K21	-+-	
+D23+I23-K23	-+-	
+D24+I24-K24	-+-	
+D25+I25-K25	-+-	
@SUM(O23..O25)	-+-	
+D28+I28-K28	-+-	
+D29+I29-K29	-+-	
+D30+I30-K30	-+-	
@SUM(O28..O30)	-+-	
+D33+I33-K33	-+-	
+D34+I34-K34	-+-	
+D35+I35-K35	-+-	
@SUM(O33..O35)	-+-	
+D38+I38-K38	-+-	
+D39+I39-K39	-+-	
+O38+O39	-+-	
+D41+I41-K41	-+-	
+D42+I42-K42	-+-	
@SUM(O40..O42)	-+-	
+D45+I45-K45	-+-	
+D46+I46-K46	-+-	
+O45+O46	-+-	
+D48+I48-K48	-+-	
+D49+I49-K49	-+-	
@SUM(O47..O49)	-+-	

+++++++	+++++++	++++++++
+D54+I54-K54	-+-	
+D55+I55-K55	-+-	11 DAYS
+D56+I56-K56	+K56-L56+N56	+K56/360*11
+D57+I57-K57	+K57-L57+N57	15 DAYS
+D58+I58-K58	+K58-L58+N58	+K56/360*15
+D60+I60-K60	@SUM(P56..P58)	

NAVCOMPT FORECASTING MODEL OUTPUT

BP-34 — CUMMULATIVE OBLIGATIONS

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP
FY 1981	27.1	89.6	143.4	186.0	239.3	330.6	413.2	463.1	529.1	606.4	667.8	701.
FY 1982	99.8	187.5	233.6	319.0	422.5	513.9	579.3	626.0	638.4	667.9	694.6	752.
FY 1983	58.3	197.1	265.2	339.0	396.7	457.3	524.4	636.0	703.6	770.5	849.8	969.
FY 1984	10013	122.3	155.0	217.0	268.4	459.6	460.5	546.0	644.0	754.7	834.6	959.
FY 1985	75.3	187.3	245.2	304.3	367.6	435.0	506.5	582.3	630.7	716.9	794.3	920.
FY 1986	69.4	150.4	197.5	255.4	306.6	371.7	442.8	523.8	587.3	665.6	735.8	845.
FY 1987	76.3	143.3	186.2	242.0	293.6	363.3	439.2	514.7	580.1	665.8	736.7	848.
FY 1988												

BP-34 — UNLIQUIDATED OBLIGATIONS

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP
FY 1981	1037.4	1052.6	1043.6	1102.9	1102.4	1118.0	1115.7	1113.1	1053.9	1025.8	994.6	983.
FY 1982	980.7	1068.6	1038.6	1042.2	1040.6	1027.9	1025.0	1065.8	1063.5	1078.0	1095.0	992.
FY 1983	1063.0	1023.6	1145.0	1157.5	1145.6	1162.5	1211.7	1228.4	1249.5	1322.2	1331.8	1006.
FY 1984	1415.4	1471.7	1478.3	1449.1	1454.5	1459.9	1458.4	1486.1	1445.9			1397.
FY 1985												
FY 1986												
FY 1987												
FY 1988												

BP-34 — FINANCIAL LEADTIMES

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP
FY 1981												
FY 1982												
FY 1983			15.6	12.4	15.9	16.1	15.8	16.2	16.2	16.8	17.1	12.
FY 1984	12.9	12.9	15.4	15.5	15.8	16.2	16.7	16.7	16.6	16.9	16.8	16.
FY 1985	17.4	17.9	18.1	17.8	18.1	18.5	18.9	19.4	18.3			
FY 1986												
FY 1987												
FY 1988												

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